



TOWN *of* BEDFORD

CLIMATE  
ACTION  
PLAN

a **bedford** twenty by **2020** project

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Final Draft | January 19, 2010



# TOWN OF BEDFORD

## **Bedford Town House**

321 Bedford Road  
Bedford Hills, NY 10507



# LETTER *from the* SUPERVISOR

We are at a watershed moment in Bedford's history. After more than two years of inspired work by the Bedford Energy Advisory Panel our Climate Action Plan is ready to be unveiled and their successor organization, "Bedford 2020 Coalition" is about to be born.

In April of 2007, the Town Board appointed an Energy Advisory Panel composed of nine individuals from a cross section of our three hamlets, all with a keen interest in the environment. These nine individuals deserve our heartfelt thanks for their countless hours of work and their commitment to our Town. The panel included; Mary Beth Kass; chair, Simon Skolnick, Mark Thielking, Janet Harckham, Dr. Stuart Weitzman, Neal Hundt, Shirley Bianco, Daniel Martin and Bill Abranowicz with early support from Lisa Schwartz.

The panel's charge was to measure our greenhouse gas emissions and to develop a plan for the Town of Bedford to reduce those emissions 20% by the year 2020.

One of the most effective tools in this process was for the town to join ICLEI, Local Governments for Sustainability, an international organization dedicated to helping local governments measure their greenhouse gas emissions, establish reduction targets, develop a plan to meet those targets, implement the measures in the town's plan and, subsequently, monitor progress.

The Bedford Plan focuses on four sectors; Energy, Transportation, Land + Water Use and Waste + Recycling. Within these sectors are many sub-categories that are incorporated into the broader topics. This is not a government plan or strictly for municipal use, but it encompasses our businesses, residences, schools and virtually every segment of our Town. We are all partners in this endeavor and we encourage your participation in helping us achieve our goal.



This effort will affect everything we do, from the cars we drive, to the houses we build, to the food we eat; but the rewards will be great. We will be saving money and we will be living healthier lives. By conserving energy we can achieve our ultimate goal of being a sustainable community. We cannot change the whole world but we can affect what happens in our Town and by doing so, insure a better future for ourselves and for generations to come.

Sincerely,

Lee V.A. Roberts  
Supervisor, Town of Bedford

# EXECUTIVE SUMMARY

## I. Bedford's Commitment

In April, 2007, Supervisor Lee Roberts and the Bedford Town Board appointed the Bedford Energy Advisory Panel (BEAP), consisting of nine individuals representing a cross section of our community. The panel was asked to study the issues relating to climate change and carbon emissions and produce a Climate Action Plan for the Town of Bedford that would provide a blueprint for reducing community-wide greenhouse gas (GHG) emissions. BEAP's first step was to join ICLEI, Local Governments for Sustainability, a membership association of more than 500 national and 1,000 international local governments committed to mitigating climate change. ICLEI assists in calculating a town's GHG emissions, establishing targets to reduce those emissions, developing a Climate Action Plan to meeting defined targets, implementing the measures in the Climate Action Plan and monitoring progress.

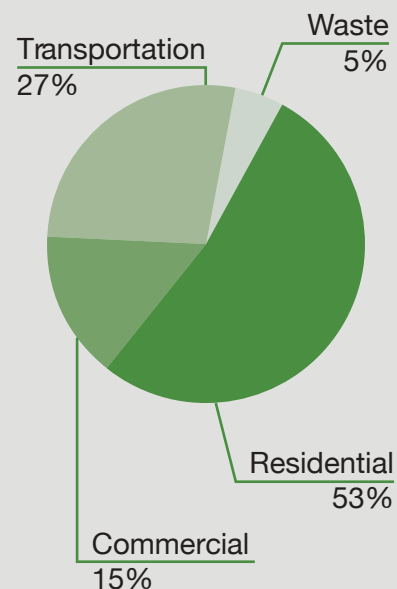
In November 2007, the Town Board took further action by passing a resolution, committing to a reduction of Bedford's GHG emissions by 20% by the year 2020. This is an aggressive goal that will have a meaningful impact on the global effort to mitigate climate change through local action, and will improve the quality of life in our own town.

The Bedford Energy Advisory Panel has spent the last two years collecting and examining data on energy consumption and waste generation across all sectors, speaking with experts, researching best practices and working with the town department heads to select the reduction measures with the most impact and greatest feasibility for Bedford.

## II. Bedford's Greenhouse Gas Emissions Inventory (Pages 18-21)

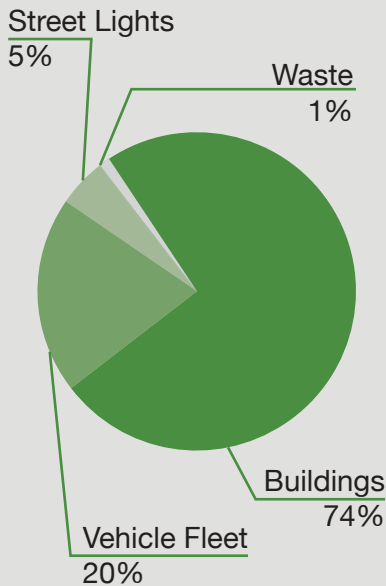
The first step toward reducing greenhouse gas emissions is to identify baseline levels of emissions in the Town of Bedford, as well as the sources and sectors of our community and government operations most responsible for those emissions. This information was key in selecting our reduction target as well as the reduction measures contained in this plan.

### Community GHG Emissions



Sector	GHG emissions (tonnes CO <sub>2</sub> e)	Energy equivalent (MMBtu)
Residential	146,451	1,806,823
Commercial	40,116	400,452
Transport	74,693	959,118
Waste	14,691	
<b>Total</b>	<b>275,951</b>	<b>3,166,393</b>

## Municipal GHG Emissions



Sector	GHG emissions (tonnes CO <sub>2</sub> e)	Energy equivalent (MMBtu)
Buildings	4,000	64,611
Vehicle Fleet	1,056	13,466
Streetlights	251	2,118
Waste	53	
<b>Total</b>	<b>5,360</b>	<b>80,194</b>

## Community Emissions Inventory

In our chosen base year 2004, the community of the Town of Bedford emitted approximately 275,951 tonnes of CO<sub>2</sub> equivalent (CO<sub>2</sub>e). Residential use was the greatest contributor to GHG emissions at 53% of the total. The Commercial sector contributed 15%, Transportation contributed 27%, and Waste contributed 5% of the community's total greenhouse gas output.

## Municipal Emissions Inventory

In the base year 2004, the Town of Bedford's government operations generated 5,360 tonnes of CO<sub>2</sub>e. The Town's buildings were the greatest contributors, emitting 74% of the total. The vehicle fleet contributed 20%, streetlights contributed 5%, and waste contributed 1% of the government emissions.

## III. Bedford's Target – Twenty by 2020

The Town of Bedford has made a commitment to reduce community-wide greenhouse gas emissions by 20% below 2004 levels by 2020. This means the community needs to reduce and prevent annual GHG emissions of 55,190 tonnes of carbon dioxide based on 2004 emissions data. If a standard growth rate of 2% were to be factored in, by 2020 the 20% target will have grown to 158,062 tonnes of needed emission reductions.

While this goal of 20% will prove to be challenging, many scientists believe that far greater reductions, closer to 80% worldwide, will be necessary to stabilize the concentration of greenhouse gases in the atmosphere. This will require a global commitment and response that does not currently exist. However, local municipalities all over the world are demonstrating strategies that effectively reduce emissions, increase economic vitality and livability. Bedford's plan proposes that we begin now, by setting a practical target with a large impact and by undertaking local actions that are feasible, and that provide multiple benefits for our community.

## IV. Reduction Measures (Pages 22-87)

The emissions reduction measures contained in this Climate Action Plan will serve as a tool for reducing Bedford's greenhouse gas emissions. The Plan includes a wide range of local actions that vary in impact, scale, difficulty

and timeframe. This list is intended to inspire the community to change its behavior in myriad ways in order to reach our goal of Twenty by 2020. The recommended measures might be adopted in whole or in part or, some, not at all. Achieving the emissions reduction target will require a community-wide process that involves all sectors of the community – residents, businesses, institutions and government.

The recommended actions contained in the plan have been grouped into four sectors: Energy, Transportation, Waste/Recycling and Land Use. Each sector is subdivided into municipal and community to illustrate how government and nongovernmental groups can take significant actions to achieve our goal.

These measures are intended to be recommendations. The many options listed in each category will be prioritized, refined and implemented in the months and years ahead. Some of these actions are already in progress, some will require further study, and some may not be feasible at this time.

Below is a summary of the recommended strategies for each sector included in the plan. See the corresponding pages for detailed recommendations: 22-85

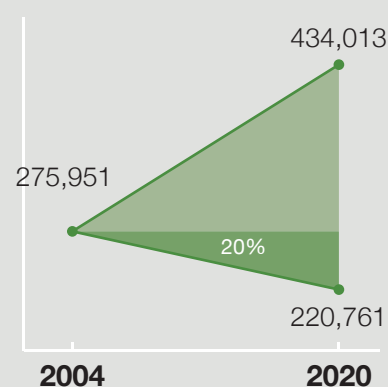
## Energy (pages 25-49)

The measures contained in this section have the greatest potential to achieve our goal of Twenty by 2020. Implementation of these measures will encourage us to examine how our homes and offices impact the environment, how we can live more economically and more sustainably by adopting the energy saving technologies available to us. Reducing GHG emissions from building energy use in Bedford will require action in two areas:

- Improving energy efficiency -- Achieving higher energy efficiency means being smarter about how we design and construct new buildings and also how we retrofit our existing housing and commercial stock.
- Increasing the number of renewable sources of electricity (such as solar, wind, hydroelectric and geothermal.) -- The support, research and development of clean, renewable sources of energy are also essential if we are to maintain our rate of growth and continued demand for energy. Unlike our existing fossil fuel infrastructure, renewables take advantage of infinite, natural and free resources and do not contribute to GHG emissions or air pollution.

## Business as Usual

Assuming an annual 2% growth rate, Bedford needs to reduce the predicted “Business as Usual” 2020 emissions by an additional 102,872 tonnes of CO<sub>2</sub>e in order to reach the desired 20% reduction below 2004 levels



## **T**ransportation (pages 51-66)

The measures contained in this section may be the most challenging to implement, as shifting demand away from the personal vehicle and toward alternative modes of transportation is dependent upon personal choice. In Bedford, transportation accounts for 27% of our greenhouse gas emissions, in addition to contributing countless other pollutants to the atmosphere. There are four principal ways to reduce the emissions from transportation vehicles in Bedford:

- Reduce the total number of miles traveled by switching transportation to mass transit, bicycling, and walking.
- Improve and increase bicycle use for transportation and recreation by constructing more walkways and/or bicycle paths to connect the hamlets.
- Shift to more fuel-efficient cars by trading in larger, less efficient vehicles for smaller vehicles, or purchasing hybrid electric vehicles.
- Switch to fuels that emit fewer pollutants, such as biodiesel and compressed natural gas (CNG).

## **W**aste + **R**ecycling (pages 67-76)

The Waste Sector contributes 5% of the Town of Bedford's annual greenhouse gas emissions. However, it is important to note that in gathering data for Bedford, we considered only waste that was generated within our town borders. Direct emissions are not reflected in our town's data because Bedford does not have a landfill. However, the consumption habits and disposal methods of the residents of Bedford are contributing to greenhouse gas emissions that would be counted in the inventory of the city in which the landfill is located.

While we may not measure a high percentage of emissions from the Waste Sector in our town, we have a responsibility to examine our existing waste generation and disposal in order to reduce emissions wherever they are measured.

The measures outlined in this section focus on the following actions in our homes and businesses:

- Conducting a waste audit to determine the source and make up of Bedford's waste.
- Reducing waste by encouraging less consumption, the purchasing of items with less packaging, and the reuse of items.

- Increasing recycling, composting and related services among Bedford residents and businesses and expanding the types of materials that can be recycled and composted.

## **Land + Water Use** (Pages 77-87)

Land use planning includes strategies for preserving the natural environment, conserving water, and minimizing the use of automobiles so that we can reduce greenhouse gas emissions and better enjoy the beauty and luxury of our natural resources. The measures contained within this sector of the Climate Action Plan support, enhance and complement the goals and recommendations in the Bedford Comprehensive Plan and focus on:

- Water conservation measures such as low flow fixtures and modifying water use behaviors
- Transit-oriented development that directs growth to areas within walking and biking distance of mass transit
- Landscape alternatives, including the use of native plants and drought resistant grasses, planting trees to shade buildings and reduce runoff, organic landscape maintenance and the use of rain water collection systems such as rain barrels.
- Increasing the supply, availability, and consumption of local food.

## **V. Implementation (Pages 88-97)**

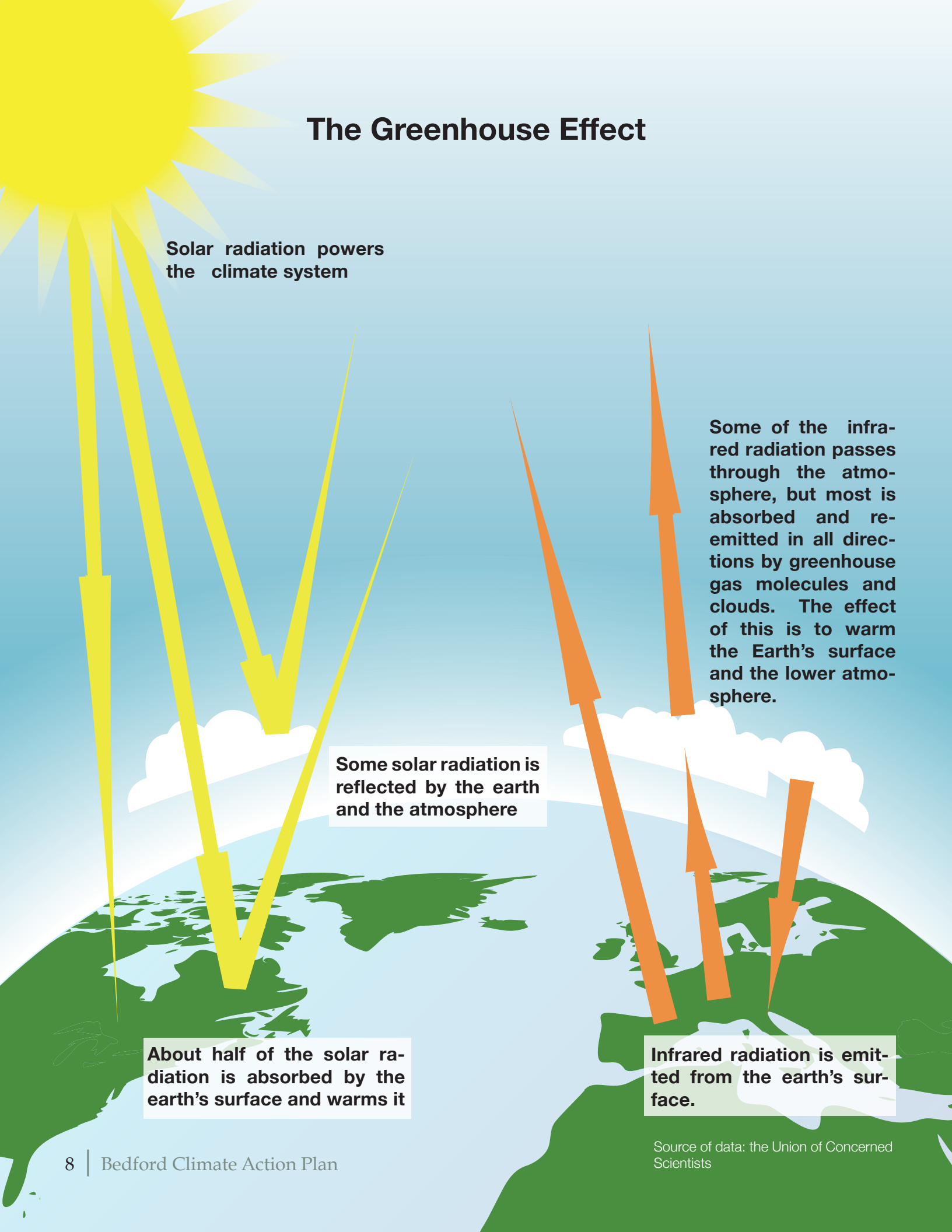
Town Board approval of the Climate Action Plan will be the final step in transitioning from the government appointed Bedford Energy Advisory Panel to a community-wide partnership including municipal government, residents, local businesses, schools, civic and religious entities. On the municipal level, local government will implement municipal measures. On the community level, a new entity, the Bedford 2020 Coalition will be created as a private, nonprofit corporation whose mission will be to organize, facilitate and work with each stakeholder to implement the community actions set forth in the Climate Action Plan. It is anticipated that the Bedford 2020 Coalition will oversee the creation of a total of 11 Task Forces, led by community members, focused on the following six subject areas: energy, waste/recycling, transportation, land use, food/agriculture, and water. In addition, there will be four Task Forces focused on users in the community, such as residents, businesses, schools and civic/religious entities. The last Task Force will be focused on marketing and PR as we try to educate the community about the benefits of changed behavior. Under the leadership of the Bedford 2020 Coalition, each Task Force will be interacting with the others to assist in implementation of the Climate Action Plan.



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# The Greenhouse Effect



Solar radiation powers the climate system

Some solar radiation is reflected by the earth and the atmosphere

About half of the solar radiation is absorbed by the earth's surface and warms it

Some of the infrared radiation passes through the atmosphere, but most is absorbed and re-emitted in all directions by greenhouse gas molecules and clouds. The effect of this is to warm the Earth's surface and the lower atmosphere.

Infrared radiation is emitted from the earth's surface.



# INTRODUCTION

Climate change is fast becoming the most pressing issue facing the global community. The warning signs like intensified weather patterns, Arctic sea ice melt and sea level rise are only the beginning, and foreshadow far worse and more localized changes over the next century. The scientific consensus reveals human actions as the most likely cause of our climate's destabilization, which leaves us with the task of reversing these changes and repairing our planet's health.

## a. Climate Science

The Earth's atmosphere is naturally composed of a number of gases that blanket the surface and act like the glass panes of a greenhouse. These "greenhouse gases" (GHGs) absorb outgoing heat and re-radiate energy back down to the surface, warming the earth and making it stable and hospitable for life at an average temperature of 60°F. Without the natural warming effect of these gases the average surface temperature of the Earth would be around 14°F.

However, recently elevated concentrations of these gases in the atmosphere have had a de-stabilizing effect on the global climate, fueling the phenomenon commonly referred to as climate change. Carbon dioxide (CO<sub>2</sub>) is the most important anthropogenic (caused or produced by humans) GHG. Our adoption of a highly industrialized economy has resulted in a need for fossil fuel industries that continuously pump additional CO<sub>2</sub> into the atmosphere. Due to our current reliance on the burning of fossil fuels like oil and coal, annual CO<sub>2</sub> emissions have grown between 1970 and 2004 by about 80%, and represent 77% of total anthropogenic GHG emissions in 2004. This drastic GHG increase since the mid 1970s has resulted in a noticeable warming, raising the average surface temperature by about 1°F in the last 40 years. The eight warmest years on record have all occurred since 2001, with the warmest year being 2005. Additionally, it is predicted that the climate will continue to warm at a rate of about 0.29°F/decade or more if we don't act now.

Because the climate and the atmosphere do not react in a linear fashion to increased greenhouse gases, it is impossible to predict what impact a ton of carbon dioxide will actually have on the global climate. The Earth's climate has a number of feedback loops and tipping points that scientists fear will increase the unwanted effects of greenhouse gases and climate destabilization beyond the rate at which it is currently occurring. For example, polar ice caps are composed of highly reflective expanses of ice that act effectively like a giant mirror, reflecting the sun's rays back into

### Greenhouse Gases



#### Carbon Dioxide (CO<sub>2</sub>)

Emitted in residential, commercial, industrial and transportation sectors during the burning of fossil fuels like oil, natural gas, coal and wood. CO<sub>2</sub> accounts for 85% of U.S. Greenhouse Gas Emissions.



#### Methane (CH<sub>4</sub>)

Emitted primarily during organic decomposition in land fills, agriculture and the raising of livestock. Methane accounts for 8% of U.S. GHG emissions and is about 25 times as potent as CO<sub>2</sub>.



#### Nitrous Oxide (N<sub>2</sub>O)

Emitted during agriculture and industrial activities. Accounts for 5% of U.S. GHG emissions.

Other man-made GHGs include **hydrofluorocarbons** (HFCs), **perfluorocarbons** (PFCs), and **sulfur hexafluoride** (SF<sub>6</sub>).

Source of data: Worcester CAP and the World Resources Institute

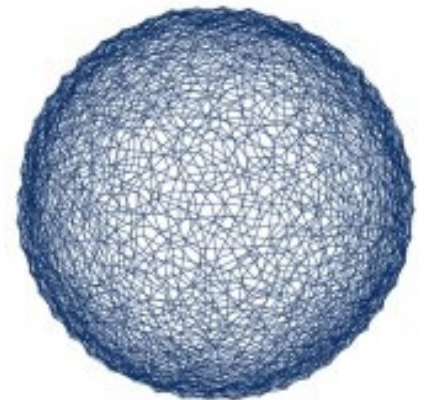
space. As the planet warms and some of this ice melts away, a darker land or ocean surface is revealed. This darker surface will tend to absorb more heat, accelerating the speed at which the planet warms with each ton of greenhouse gas emitted, and in turn melting more arctic ice reinforcing the positive feedback loop. Another example is the behavioral feedback loop associated with air conditioner use. As the climate warms, people, not accustomed to the temperature change, buy more air conditioners and run them for extended periods of time. This results in a need for more energy production (often from fossil fuel sources) which warms the climate and encourages the purchase of more air conditioners.

## b. International & National Policy

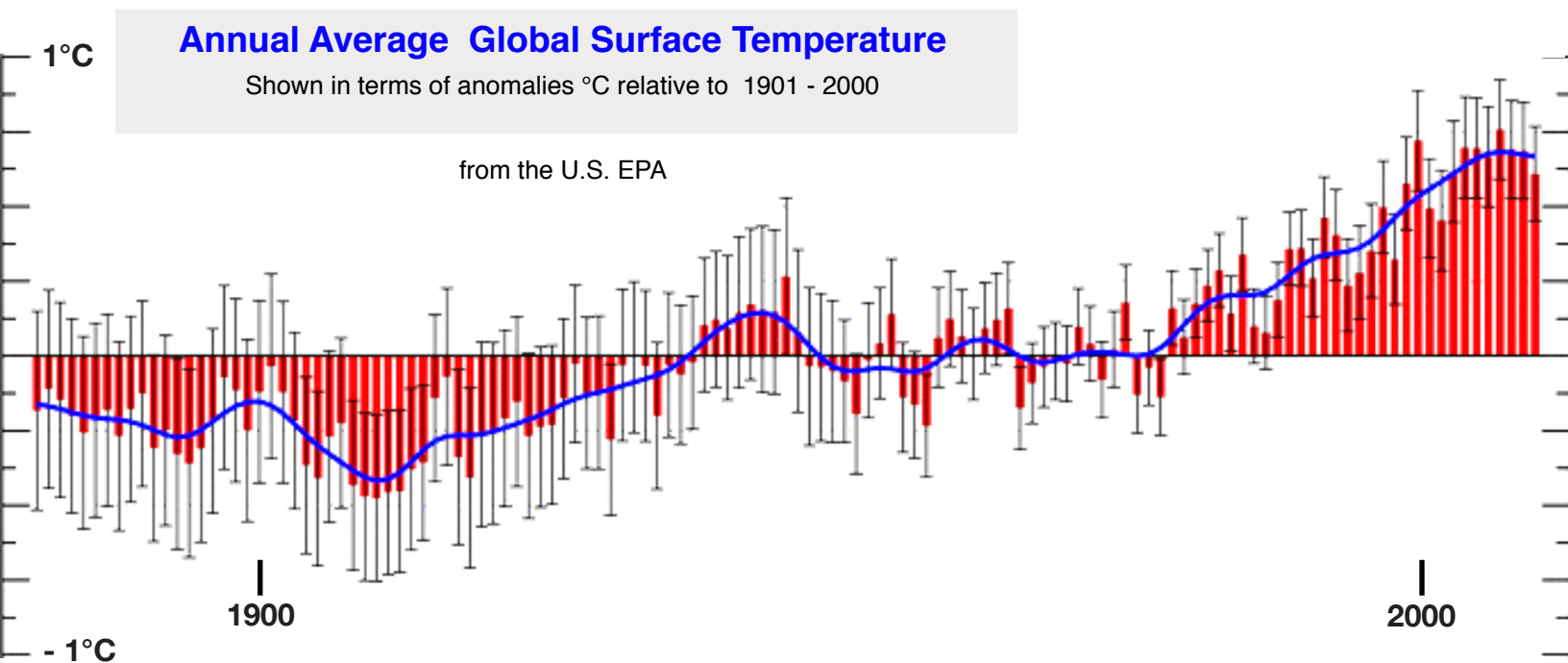
Although efforts have been made on international and national scales to slow the changes, none have had any considerable lasting effect on climate legislation.

Between 1997 and 1999, the Kyoto Protocol was negotiated in Japan, hoping to inspire industrialized countries to reduce their GHG emissions by 5% below 1990 levels. Even though this ambitious agreement has involved most of the global community in GHG reductions, the United States has remained hesitant to pledge support and sign.


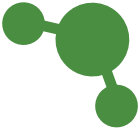

Currently however, the US is working to pass climate legislation that would impose a cap on emissions and reduce them 80% by 2050 through a Cap and Trade program while preparing for another round of climate negotiations in Copenhagen for COP15. Although mindful that these efforts will come to fruition at some point, we, in Bedford, have decided to take action locally and as soon as possible. We have joined ICLEI – Local Governments for Sustainability, agreed on a 20% GHG reduction by the year 2020 and are now publishing this Climate Action Plan while waiting for broader legislation to pass.



COP15  
COPENHAGEN  
UN CLIMATE CHANGE CONFERENCE 2009



## Air Pollutants

Pollutant	Health Effects
<b>Nitrogen Oxides (NOx)</b> 	Decreases lung function. Associated with respiratory disease in children.
<b>Sulfur Dioxide (SO2)</b> 	Causes coughing, wheezing, shortness of breath, nasal congestion & inflammation. Makes asthma worse & destabilizes heart rhythms. Can cause low birth weight & increased risk of infant death.
<b>Carbon Monoxide (CO)</b> 	Can cause cardiovascular problems, chest pain & vision problems. Reduces your ability to work or learn & complete complex tasks. High levels can cause serious respiratory problems or death.
<b>Volatile Organic Compounds (VOCs)</b>	Can cause eye, nose and throat irritation, headaches, loss of coordination, nausea, damage to liver, and central nervous system. Some may also cause cancer.

Source of data: Worcester, MA CAP

## c. Our Climate Action Plan (CAP)

By consciously acting to reduce GHG emissions on a local level, we have the opportunity to address the challenge of climate change directly, save resources and preserve the quality of our lives. By adopting a climate action plan, we can save money, create jobs, improve our health, promote energy security, and work towards addressing climate change without drastically changing our daily behavior.

### Economic Benefits + Job Creation

A low carbon future will promote cost saving technologies and increase job creation across the nation. We will be encouraging the use of more efficient appliances, energy audits and building retrofits and other reduction measures that will all dramatically lower your utility bills. The development of a renewable energy infrastructure featuring solar and wind power will reinforce the resiliency of our local and national economy. The purchase of fuel efficient and alternative fueled cars and trucks will keep energy dollars in our country and region instead of exporting them to often hostile nations overseas.

This will create more jobs, save money for Bedford's residents and drive demand for locally produced products and services. Bedford spends an average of \$5,250 per household annually on electricity and heating fuels. If all of our 6400 households achieved 30% efficiency improvements through energy audits and retrofits, or more efficient appliances, our households would save an average of \$1,575 and the community would collectively save over \$10 million and create many new jobs.

Similarly, in transportation, if 500 vehicles earning 30 mpg were swapped out for vehicles achieving 45 mpg, the burning of 109,000 gallons of imported gasoline would be avoided and \$215,000 dollars would be saved.

### Quality of Life + Health

In addition to countless economic benefits, climate protection can also improve community well being. By reducing greenhouse gas emissions and waste, we can make our environment a much healthier place to live in with cleaner air and water. Living spaces designed with natural light in mind also make for a less stressful and more productive lifestyle within. Outdoors, as we rethink our transportation and zoning patterns, we can encourage a more active lifestyle through biking and walking.

Similarly, by eating locally produced, fresh food, we can lower greenhouse gas emissions associated with food production and improve our daily diet. Modern day agribusiness promotes unsustainable farming practices for

both people and the earth with excessive use of pesticides and emissions generated with food transport. Eating organic, local food means that you are reducing food miles and consuming a better, healthier product. As a rural town, Bedford has great potential to build local food infrastructure.

In Bedford, we are already aware of the decreasing quality of our air and the increased prevalence of diseases. Climate Change will bring about severe and longer heat waves that can threaten the health of the most vulnerable. Heat waves have already led to power outages, resulting in heat stroke and stress among the aging. Further, the EPA has classified Westchester as an air quality nonattainment area (meaning, not in compliance with air quality standards under the Clean Air Act) due to persistent ground level smog (ozone) and particulates. Bedford's proximity to highway 684 and the Saw Mill River Parkway exposes its residents to additional levels of pollutants as vehicular emissions increase. Worsening air quality from the combination of vehicular emissions, increased heat, and increased electrical usage are predicted to contribute to increased cardiovascular and respiratory diseases. With warmer and longer summers, the pollen and mold season will be extended, leading to allergies and triggering increased asthma attacks. West Nile virus carried by mosquitoes and Lyme disease carried by ticks are expected to become more prevalent, with warmer temperatures and increased flooding.

## Energy Security

America's reliance on foreign oil and other fossil fuels threatens our environment, our economic prosperity and our national security. Americans represent less than 5% of the global population but consume nearly one quarter of the world's produced oil for transportation and heating. Additionally the U.S. holds less than 2% of the world's proven oil reserves but, in order to meet its needs, now imports 60% of its oil from foreign sources. The U.S. also holds around 2% of the world's natural gas reserves. At current consumption rates, we will have to begin importing large quantities to generate electricity.

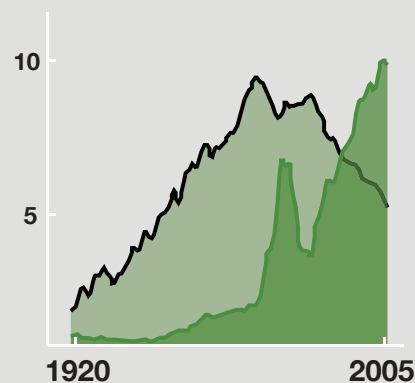
Domestic oil production hit its peak in 1970 and since then has been declining. The U.S., not being an oil rich area, cannot indefinitely exploit its dwindling oil reserves. Instead, the U.S. will import more and more fossil fuels from foreign nations. Foreign oil imports accounted for a third of America's record trade deficit in 2006 and are responsible for half of the increasing imbalance since 2002. Importing oil and natural gas in such vast quantities creates a trade imbalance that weakens the U.S. dollar in the global economy. This consequently drives up the cost of imported goods, and passes them along to American families. Additionally, this dependence makes the United States more dependent on, and vulnerable to, the decisions of other governments.



## United States Oil Production + Imports

in millions of barrels/day

Domestic Oil Production  
Foreign Imports

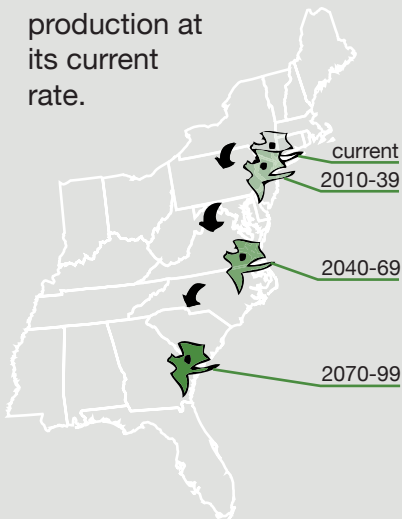


generated from EIA data



## Westchester's Climate

Westchester's climate will resemble that of southern Georgia by the end of the century if we continue GHG production at its current rate.



NY Tri-State Area



Westchester County

Source of data: Westchester County Action Plan

This situation leads to a heavy national security risk. Oil money is increasingly being used to fund governments and projects that are opposed to U.S. interests. Profits from oil often accumulate in the hands of totalitarian foreign governments that not only repress their own people, but in many cases, also fund terrorist cells and training camps that amplify anti-American sentiment. This gives oil producing nations a great amount of power in global affairs. As oil supplies dwindle and consuming countries get increasingly desperate, competition for limited resources will intensify and oil producing nations will become ever-more powerful.

Bedford relies on fuel oil, natural gas and electricity for energy used in homes and businesses. The vast majority of this energy is imported. Electricity comes from generating facilities throughout the Northeast and eastern Canada and is delivered over a network of transmission grids. Natural gas is delivered from an even wider area through pipelines. Independent dealers deliver fuel oil, which is derived mostly from overseas. Reduction of imported energy will not only address the national issues described above, but will also free more local dollars for other priorities. Bedford now has the opportunity to use cleaner, cheaper and more efficient methods to power our businesses, our homes, and our lives and to mitigate the national problem of imported fossil based energy sources.

## Climate

The development of environmentally friendly practices by our town, and eventually on a national scale, is the best way to ensure that our climate stays well-suited to human comfort. Never in the past 1000 years has the planet warmed at a faster rate than during the 20th century, and the most recent decade has been the warmest on record. If this trend to continues it could result in decreased agricultural output, increased catastrophic weather events such as forest fires, drought and floods and displacement of entire populations due to rising sea levels.

In the Northeast, we are beginning to see the devastating changes of excessive greenhouse gas accumulation in the atmosphere and a changing climate. It has been predicted that winters could warm by 8 to 12°F and that summers could warm by 6 to 12°F by late this century. This means that our snow filled winters may soon be a thing of the past. In fact, models indicate that without change, only western Maine may be able to support skiing by the end of the century.

In Westchester, the changing climate also means an increase in severity and frequency of storms, including rainfall events, hurricanes, tropical storms, nor'easters, tornados, and other high wind hazards. In fact, If these trends in GHG emissions continue unchecked, the NECIA report projects that the climate in Westchester will resemble the climate of southern Georgia by the

end of the century.

For Bedford, this means increased flooding of our low lying roadways like the Saw Mill River Parkway and increased power outages due to downed trees and extreme weather events.

## **d. A Sustainable Bedford**

Over the past two years our town has achieved government support and action to significantly reduce GHG emissions. We have a proven track record of enlisting community, business, civic and residential engagement on these issues and we are now poised for the creation of a “Sustainable Bedford.”

The completion of our Climate Action Plan will finalize the transition from the government appointed Bedford Energy Advisory Panel to a community wide partnership and new entity to be known as the “Bedford 2020 Coalition”. This community wide stakeholders’ group will be organized into eleven task force areas, each charged with implementing the measures set forth in our Climate Action Plan.

No single sector of our community can reach the Town’s goal of a 20% reduction in GHG emissions by 2020 by acting alone. We must all work together. The Bedford 2020 Coalition Task Force user groups – residents, businesses, schools, religious and civic entities– will play an active role in carrying out the measures contained in the CAP. While the action steps are grouped by category, such as energy, waste, etc, we anticipate that each user group will focus on every measure that applies to them.


### **Residents**

Residential behavior is a critical component of climate change efforts in the Town of Bedford. The residential sector is the greatest contributor to community wide GHG emissions. 53% of the town’s GHG emissions comes from household energy use and personal vehicles. It is clear that the town’s reduction goals cannot be achieved without the commitment of Bedford’s residents. Since most individuals do not know what actions they can take in their own lives to do their part, the specific reduction measures contained the CAP must be accompanied by a community wide, public campaign to educate, inform and inspire Bedford’s residents to take action in their own lives.

### **Businesses**

Bedford’s commercial sector contributes 15% of the community’s total GHG emissions. Businesses – both large and small - have the opportunity and responsibility to reduce GHG emissions in their own operations by focusing





on their own buildings and facilities, their business practices and their relations with employees, vendors, contractors and customers.

Being green is good for business. It is the intention of the Bedford 2020 Coalition to work with local businesses to assist them in reducing their contributions to GHG emissions and to promote those businesses as strong partners in this effort. Ultimately, buying local is a significant component of a healthy, sustainable community. Additionally companies who want to prepare themselves to thrive in the future should be sensitive to the growing consumer demand for environmentally-responsible products and services, and willing to participate as full and active partners in the community's efforts to be green.

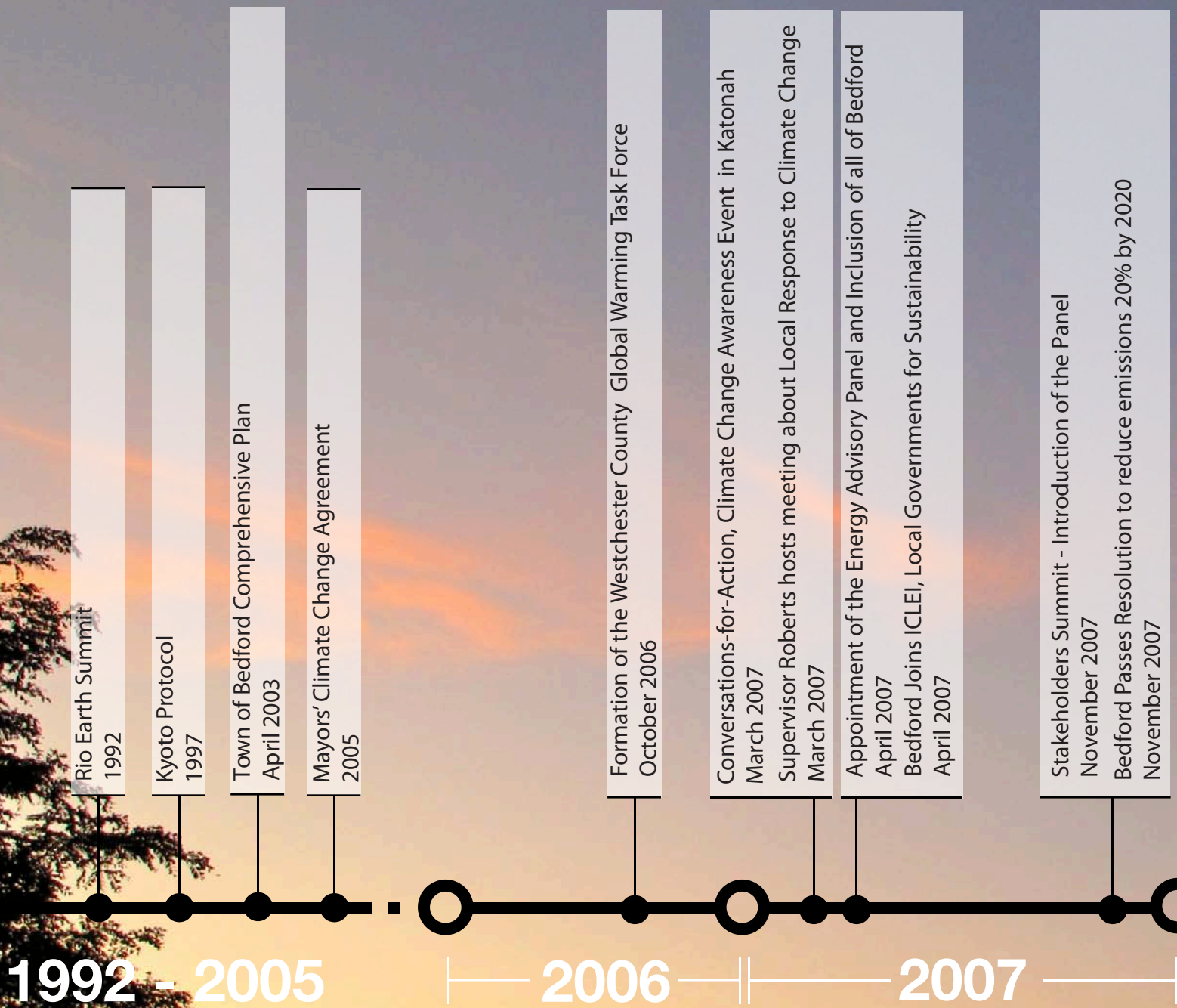
## Schools

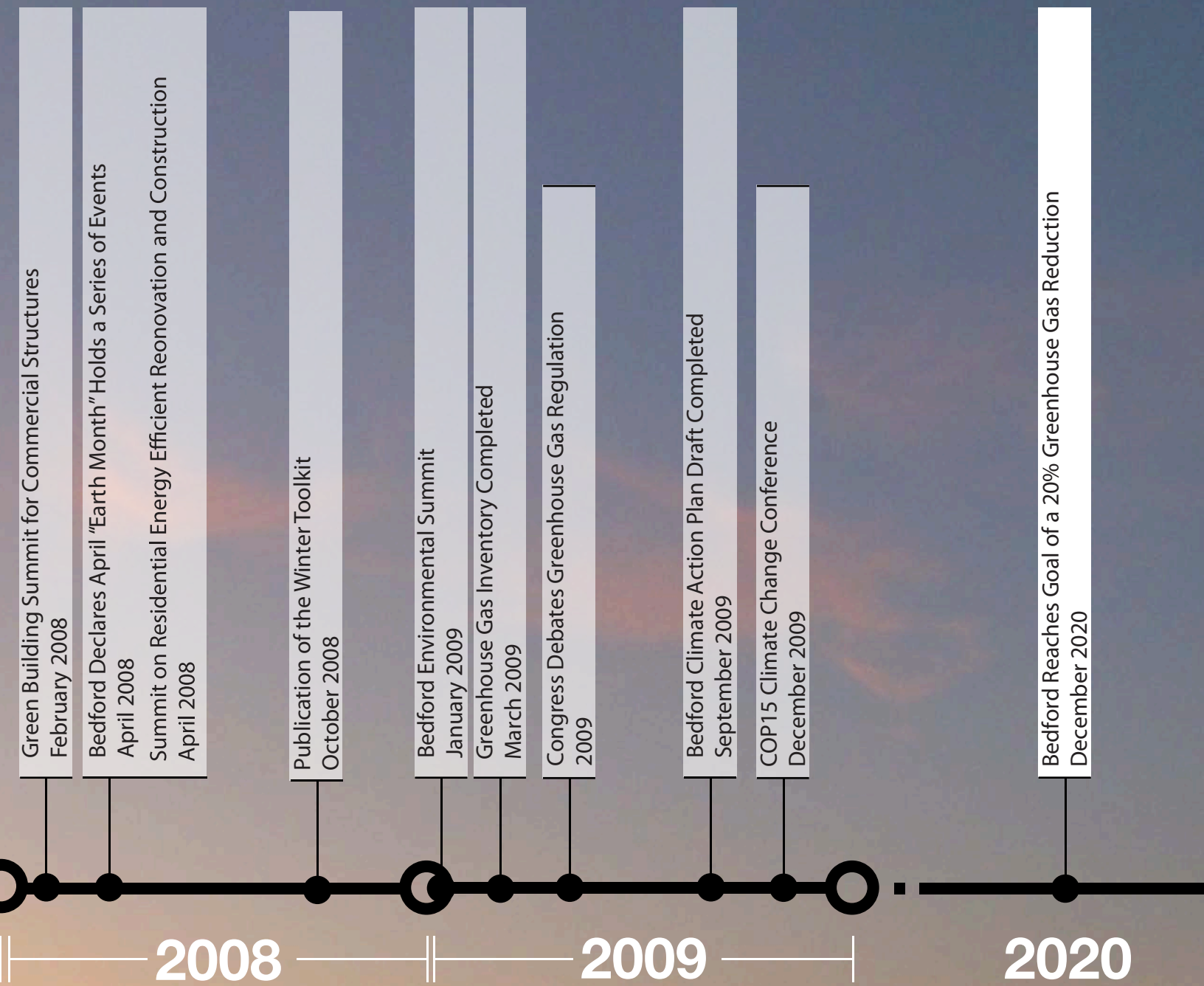
The Town of Bedford recognizes that the two public school districts and the private schools within the town's geographic borders are uniquely positioned to help us reach our Twenty by 2020 goals. School campuses are a microcosm of the town. With multiple buildings, a vehicle fleet, waste generation and campus use contributing to their overall GHG emission, they are dealing with all four sectors of energy, transportation, waste/recycling and land use in their own sustainability efforts.

Both area public school districts--the Bedford Central School District (BCSD) and the Katonah Lewisboro School District (KLSD)-- have instituted Sustainability Policies establishing sustainability goals for the curriculum and campus operations. Their forward thinking actions are a model for the Town as we start the implementation of the Climate Action Plan. We are fortunate to count both school districts and the private schools as our partners in this town wide effort. As we move forward to educate the wider community about the full range of measures available to reduce GHG emissions, we will be looking to the schools – the administration, the students and the parent body as vital leaders and partners in this effort.

## Civic and Religious Entities

Like the schools, most civic and religious entities in the Town of Bedford confront GHG emission issues in the management of their buildings and land, their waste and in their relationship with constituents. Like the schools, their leadership in the area of GHG emission reductions will have tremendous impact throughout the community. In particular, religious entities have the opportunity and the ability to model action – with energy audits and energy efficient upgrades of their houses of worship, community gardens established and run by parishioners, and by leadership in showing people how to become better stewards of the environment.





# GREENHOUSE GAS EMISSIONS INVENTORY

## **a. Introduction**

In April 2007, the Town of Bedford joined ICLEI, Local Governments for Sustainability and the Town Board adopted a resolution committing the Town to taking action for climate protection. Through this resolution, the Town recognized the “profound effect” that greenhouse gases emitted by human activity are having on the Earth’s climate, as well as the Town’s opportunity to reduce these emissions, both through its government operations and by inspiring change throughout the community. With the assistance of ICLEI, the Town began its efforts to identify and reduce greenhouse gas emissions.

Presented here are estimates of greenhouse gas emissions resulting from our community as a whole, as well as those resulting from the Town’s internal government operations. Due to availability, community and government operations data is based on the year 2004. This data will provide a baseline against which we will be able to compare future performance, enabling us to demonstrate progress in reducing emissions.

By adopting a resolution committing the Town to locally advancing climate protection, The Town of Bedford has joined an international movement of local governments. More than 1000 local governments, including over 500 in the United States, have joined ICLEI’s Cities for Climate Protection (CCP) campaign

The CCP campaign provides a framework for local communities to identify and reduce greenhouse gas emissions, organized along five milestones:

- (1) Conduct an inventory of local greenhouse gas emissions;
- (2) Establish a greenhouse gas emissions reduction target;
- (3) Develop an action plan for achieving the emissions reduction target;
- (4) Implement the action plan; and,
- (5) Monitor and report on progress.



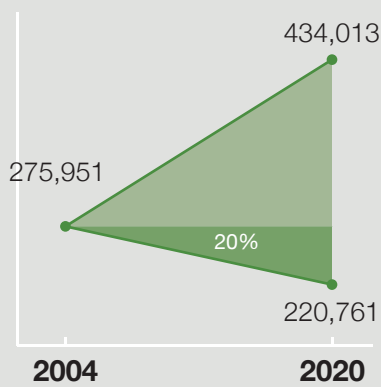
## b. Methodology & Model

The first step toward reducing greenhouse gas emissions is to identify baseline levels of emissions in the Town of Bedford, as well as the sources and sectors of our community and government operations most responsible for those emissions. This information was key in selecting our reduction target as well as the reduction measures contained in this plan.

ICLEI's Communities for Climate Protection methodology assists local governments in systematically tracking community energy and waste related activities, and in calculating the relative quantities of greenhouse gases produced by each activity and sector. The inventory methodology involves performing two assessments: a community wide assessment and a separate inventory of government facilities and activities. The government inventory is a subset of the community inventory.

### Business as Usual

Assuming an annual 2% growth rate, Bedford needs to reduce the predicted "Business as Usual" 2020 emissions by an additional 102,872 tonnes of CO<sub>2</sub>e in order to reach the desired 20% reduction below 2004 levels



To facilitate community efforts to reduce greenhouse gas emissions, ICLEI developed the Clean Air and Climate Protection (CACP) software package with the State and Territorial Air Pollution Program Administrators (STAPPA), the Association of Local Air Pollution Control Officials (ALAPCO), and Torrie Smith Associates. This software calculates emissions resulting from energy consumption and waste generation. The CACP software determines emissions using specific factors (or coefficients) according to the type of fuel used. Greenhouse gas emissions are aggregated and reported in terms of equivalent carbon dioxide units, or CO<sub>2</sub>e. Converting all emissions to equivalent carbon dioxide units allows for the consideration of different greenhouse gases in comparable terms.

The emissions coefficients and methodology employed by the CACP software are consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National Inventories) and the U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA form 1605). However, it is worth noting that, although the software provides the Town of Bedford with a sophisticated and useful tool, calculating emissions from energy use with precision is difficult. The model depends upon numerous assumptions, and it is limited by the quantity and quality of available data. With this in mind, it is useful to think of any specific number generated by the model as an approximation of reality, rather than an exact value. Being exact is less important than being able to track progress by conducting future in-

ventories using the same methodology – thus comparing apples to apples.

### c. Creating the Inventory

Our greenhouse gas emissions inventory consists of two essentially distinct inventories: one for the Town of Bedford community as a whole, defined by our geographic borders, and one highlighting emissions resulting from the Town of Bedford’s internal government operations. The government inventory is a subset of the community-scale inventory (the two are not mutually exclusive). This allows the government, which formally committed to reducing emissions, to track its individual facilities and vehicles and to evaluate the effectiveness of its emissions reduction efforts at a more detailed level. At the same time, the community-scale analysis provides a performance baseline against which we can demonstrate progress being made throughout the Town of Bedford community.

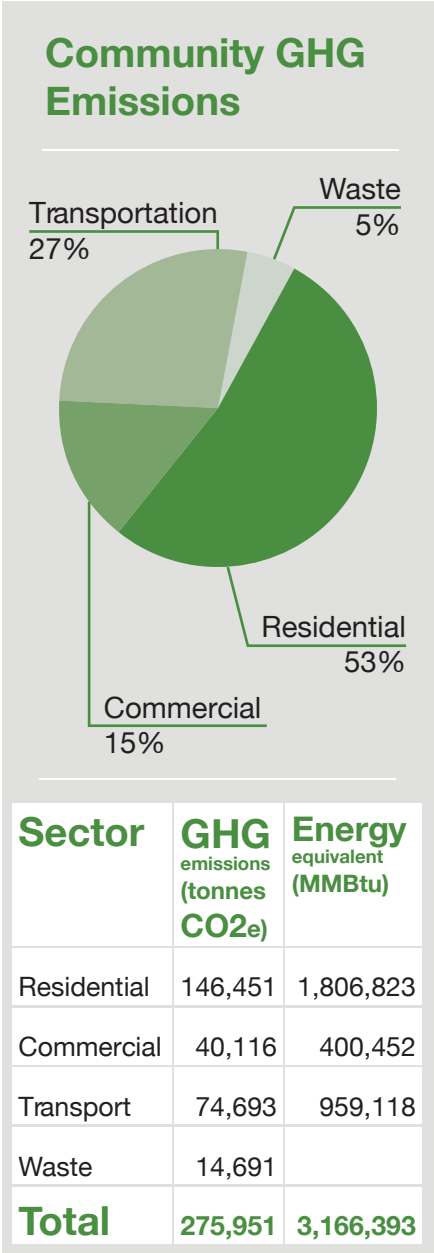
Creating our emissions inventory required the collection of information from a variety of sources (See Appendix for complete inventory source data.) Data from the year 2004 was used for both the community inventory and the government inventory.

When calculating the Town of Bedford’s emissions inventory, all energy consumed in the Town of Bedford was included. This means that, even though the electricity used by Town of Bedford residents is produced elsewhere, this energy and the emissions associated with it appears in the Town of Bedford’s inventory. The decision to calculate emissions in this manner reflects the general philosophy that a community should take full responsibility for the impacts associated with its energy consumption, regardless of whether or not the energy generation occurs within its geographic borders.

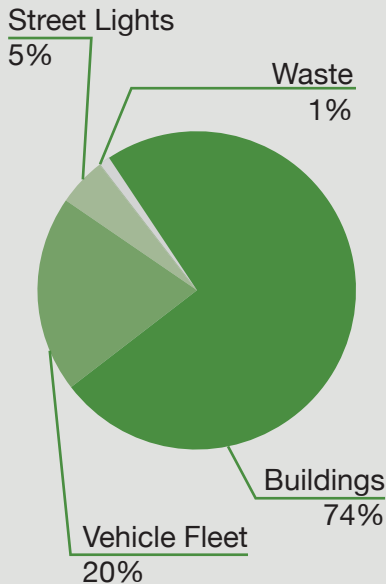
### d. Community Emissions Inventory

In the base year 2004, the community of the Town of Bedford emitted approximately 275,951 tonnes of CO<sub>2</sub>e. As shown in the pie chart above, Residential use was the greatest contributor to greenhouse gas emissions at 53% of the total. The Commercial sector contributed 15%, Transportation contributed 27%, and Waste contributed 5% of the community’s total greenhouse gas output.

The Town of Bedford community’s consumption of electricity and other fuels in local buildings and vehicles is also responsible for the release of criteria air pollutants, including NO<sub>x</sub> (nitrous oxide), SO<sub>x</sub> (sulfur oxides), CO (carbon monoxide), VOCs (volatile organic compounds), and PM<sub>10</sub> (particulate matter 10). The Transportation sector is responsible for the majority of



## Municipal GHG Emissions



Sector	GHG emissions (tonnes CO <sub>2</sub> e)	Energy equivalent (MMBtu)
Buildings	4,000	64,611
Vehicle Fleet	1,056	13,466
Streetlights	251	2,118
Waste	53	
<b>Total</b>	<b>5,360</b>	<b>80,194</b>

NOX, CO and VOC emissions, while energy used in buildings is primarily responsible for emissions of SOX and PM10.

## e. Municipal Emissions Inventory

In the base year 2004, the Town of Bedford's government operations generated 5,360 tonnes of CO<sub>2</sub>e. The Town's buildings were the greatest contributors, emitting 74% of the total. The vehicle fleet contributed 20%, streetlights contributed 5%, and waste contributed 1% of the government emissions.

Government operations emissions in the Town of Bedford constitute about 2 percent of the community's total greenhouse gas emissions. This is not unusual; local government emissions typically account for around two percent of community levels. As a minor contributor to total emissions, actions to reduce government operations energy use will have a limited impact on the Town of Bedford community's overall emissions levels. However, as previously mentioned, government action has symbolic value that extends beyond the magnitude of emissions actually reduced.

## f. Conclusion

In passing a resolution to join the Communities for Climate Protection campaign, the Town of Bedford made a formal commitment to reduce its emissions of greenhouse gases. This inventory lays the groundwork for those efforts by estimating baseline emissions levels against which future progress can be demonstrated.

The Bedford Climate Action Plan proposes that we reduce GHG emissions by 20 percent below 2004 levels by 2020. This means the community needs to reduce and prevent annual GHG emissions of 55,190 tonnes of carbon dioxide based on 2004 emissions. Assuming a standard growth rate of 2%, by the year 2020 the 20% target will have grown to 158,062 tonnes of needed emission reductions. However, many scientists believe that far greater reductions, closer to 80 percent worldwide, will be necessary to stabilize the concentration of greenhouse gases in the atmosphere. This will require a global commitment and response that does not currently exist. However, local municipalities all over the world are demonstrating strategies that effectively reduce emissions, increase economic vitality and livability. Bedford's plan proposes that we begin now, by undertaking local actions that are feasible, impactful and that provide multiple benefits for our community.



# REDUCTION MEASURES

## a. Summary

The emissions reduction measures contained in this section are intended to serve as a tool for reducing Bedford's greenhouse gas emissions. There is no simple path nor any one measure that will get us to our lofty goal of a twenty percent GHG reduction by the year 2020. This is why we have included a myriad of actions, varying in scale, difficulty and timeframe to be used, in part or in whole, to meet our goal. Achieving the emissions reduction target will require a community-wide process, involving residents, businesses, schools, institutions, civic and religious organizations, and government.

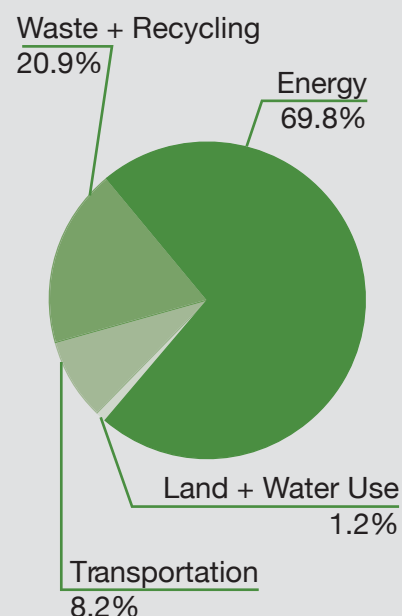
The recommended actions described in this section have been grouped into four sectors: Energy, Transportation, Waste + Recycling and Land + Water Use. Each sector is also split into municipal (grey pages) and community (white pages), so that the Bedford government will be able to easily locate and implement the most effective measures and act as a role model for the second half of the plan and the residents. Where possible, each measure has been examined to determine: ghg reduction potential, cost and ease of implementation, payback period, and any additional benefits. We have also included all information pertaining to other pollutants that will be prevented.

The Bedford Energy Advisory Panel has spent the better half of two years, speaking with experts, researching best practices and working with the town department heads to select the measures that are the most impactful and the most feasible for Bedford. We urge you to use this plan, knowing that it has been customized for the needs of our community.

These measures are intended to be potential measures. This menu option of recommendations will be prioritized and implemented in the months and years ahead. Some of these actions are already in progress, some will require further study, and some may not be possible at this time. We all have a role to play in turning this plan into action. It will require the political will of our local leaders, as well as the will of the entire community.

The information contained in the Emissions Reduction Measures Section of the Bedford Climate Action Plan was obtained using ICLEI's Climate and Air Pollution Planning Assistant (CAPPA) software. CAPPA provides information and quantification tools for over 100 distinct emissions reduction strat-

## Reduction Measures



Sector	GHG emissions (tonnes CO <sub>2</sub> e)	Number of Measures
Energy	135,808	23
Waste + Recycling	40,591	19
Transport.	15,922	23
Land + Water Use	2,313	10
<b>Total</b>	<b>194,634</b>	<b>75</b>

## CAP Co-Benefits

Throughout the Bedford Climate Action Plan, the term Co-Benefits refers to positive impacts our proposed measures will have on our lives.



**Economic Benefits  
& Job Creation**



**Quality of Life &  
Health**



**Energy Security**



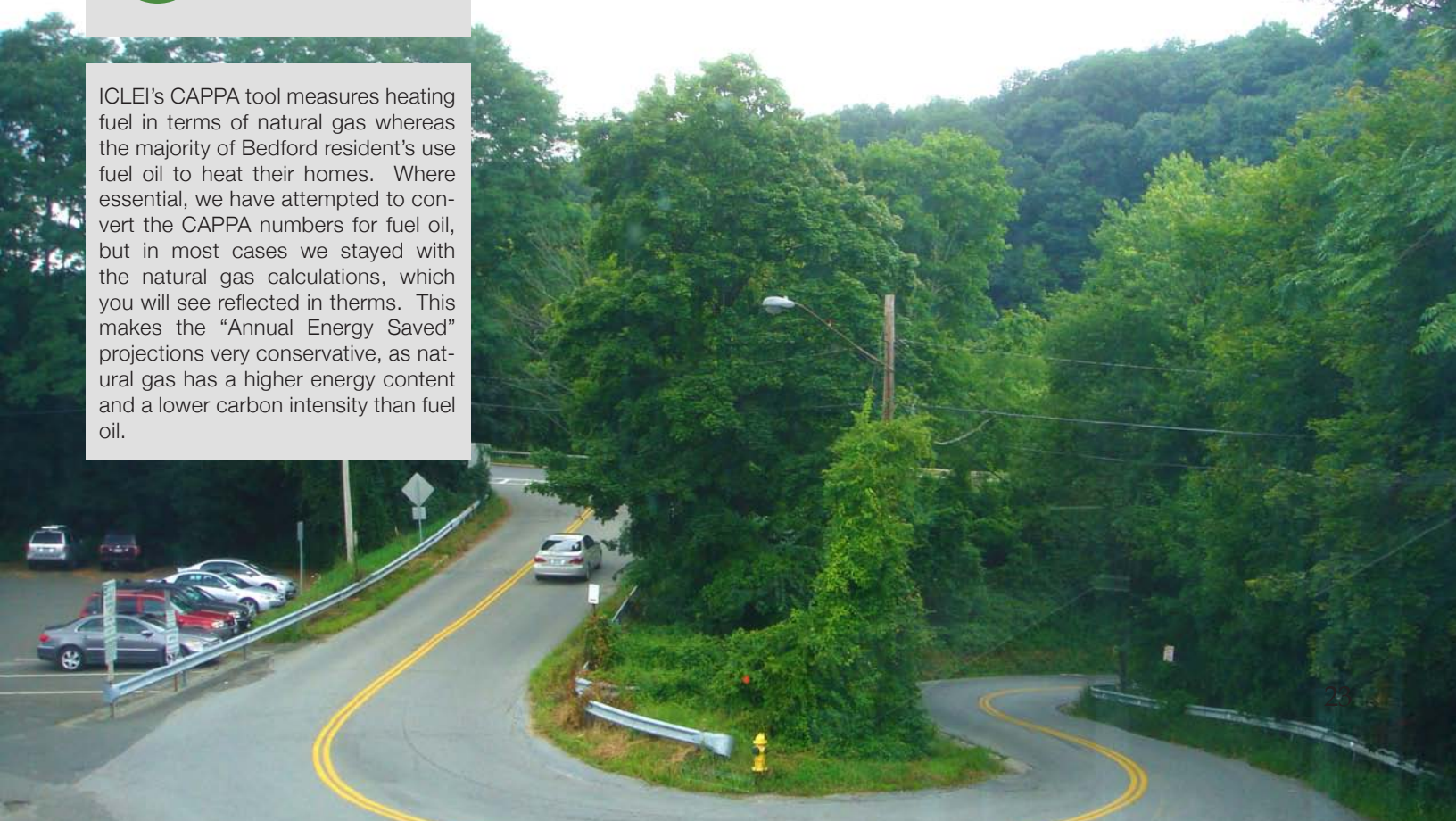
**Climate &  
Greenhouse Gas  
Reductions**

ICLEI's CAPP tool measures heating fuel in terms of natural gas whereas the majority of Bedford residents use fuel oil to heat their homes. Where essential, we have attempted to convert the CAPP numbers for fuel oil, but in most cases we stayed with the natural gas calculations, which you will see reflected in terms. This makes the "Annual Energy Saved" projections very conservative, as natural gas has a higher energy content and a lower carbon intensity than fuel oil.

egies. The quantification calculator proved invaluable in selecting reduction measures for Bedford and determining which to include in our Climate Action Plan. We relied heavily on the measure descriptions provided by ICLEI for our Climate Action Plan (CAP) and tailored them to fit Bedford's needs. CAPP uses default assumptions regarding resulting performance of each strategy that are based on real-world data from other U.S. communities and a variety of expert sources. These assumptions can be customized to include more accurate local data, which we have done where such data is available.

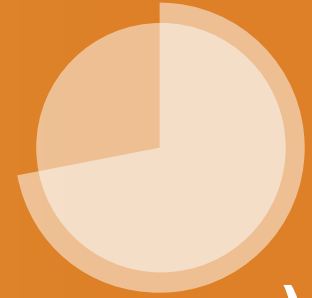
It is important to note that CAPP is a tool, designed to highlight the potential of each reduction measure. However, its dependence on assumptions makes it limited by the quantity and quality of available data. Anytime we are able to find more detailed information, we will be adding data, leading to slight changes in our predicted outcomes.

The quantification data for each measure has been included in the CAP, where available, to assist in prioritizing actions for implementation. Data on scope, cost, and payback are estimates based on the best available current data. At the time of implementation, each measure will be further scoped for more accurate and detailed cost and payback projections.





## b. Energy



(69.7% of total proposed GHG reductions)

In the United States, residential and commercial buildings account for 48% of the country's energy consumption. Furthermore, 75% of a building's lifetime costs are related to this large-scale consumption and its maintenance. In Bedford, the numbers are equally staggering - In 2004 residential, commercial, industrial, institutional and municipal buildings together were responsible for the emission of 186,567 tonnes of CO<sub>2</sub>e into the atmosphere, making up 68% of the town's total GHG emissions in that year. Of these emissions, about 78% can be attributed to residential structures.

Reducing GHG emissions from building energy use in Bedford will require action in two areas: improving energy efficiency and increasing the number of renewable sources of electricity (such as solar, wind, hydroelectric and geothermal.)

Achieving higher energy efficiency means being smarter about how we design and construct new buildings but also how we retrofit our existing housing and commercial stock. Retrofit recommendations can range from simple to complex including measures such as increasing building insulation; installing more efficient heating, ventilation, and air conditioning (HVAC) equipment; and using more efficient lighting, appliances, and equipment.

The support, research and development of clean, renewable sources of energy are also essential if we are to keep up with our rate of growth and continued demand for energy. Unlike our existing fossil fuel infrastructure, renewables take advantage of infinite, natural and free resources and do not contribute to GHG emissions or air pollution.

The measures contained in this section have the biggest potential to get us to our Twenty by 2020 goal. The implementation of these measures will encourage us to rethink how our homes and offices impact the environment, and how we can live more sustainably and economically with the energy-saving technologies available to us.

total GHG reduction in sector: **135,808 Tonnes CO<sub>2</sub>e**

co-benefits:    

# Municipal Energy Measures

## Community Scale Renewable Energy

Renewable energy - energy generated by natural resources - contributes little or no greenhouse gasses (GHG) to the atmosphere, reduces unhealthy by-products of burning fossil fuels and helps us reduce the need to import energy fuels from overseas. Renewable energy sources include: solar, wind, hydroelectric, and geothermal.

If the Town of Bedford purchased 100% renewable energy from conventional sources, such as those currently available through your utility, the cost would amount to over \$215,000 annually. The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should commence a study to identify all available renewable energy assets in the community as well as opportunity sites where RE projects might best be implemented to bring this cost down. In addition, the study would include potential finance options. The results of this study could allow us to move toward increasing renewable energy production locally, bring down the incremental cost of using renewable energy, and ultimately move to 100% renewable energy use in town-owned buildings by 2020.

**Total Cost:** \$215,532 annually  
(\$0.10 per kWh additional cost)

**Payback:** Not available

**Co-Benefits:**    

### Scope

100% RE Purchased

### Annual Reductions

**CO<sub>2</sub>e:** 803 Tonnes in total Community Emissions and 15% reduction in TOB total Emissions and 75% of 20% by 2020 goal)

**Energy:** N/A

**NO<sub>x</sub>:** 2,145 lbs

**SO<sub>x</sub>:** 9,044 lbs

**CO:** 2,246 lbs

**VOCs:** 252 lbs

**PM<sub>10</sub>:** 1,981 lbs

## Energy Efficiency Retrofits of Existing Town Owned Facilities

Town owned buildings account for 74% of total municipal energy use and the resulting GHG emissions attributed to Town operations. Many measures can be applied to existing buildings to improve their efficiency, including using efficient lightbulbs and fixtures, increasing insulation, replacing windows, and upgrading HVAC systems for 15-40% energy savings.

The CAP recommends that the Town of Bedford carry out the energy efficiency retrofits and upgrades that were recommended in the 2009 NYSERDA Energy Audit of the existing municipal buildings and facilities.

**Cost:** \$166,885

**Payback:** 4 years

**Co-Benefits:**    

### Scope

100% of 39,620sq/ft of Town of Bedford building space

### Annual Reductions

**CO<sub>2</sub>e:** 177 tonnes (3.3% reduction in total TOB emissions, 4.4% reduction in TOB Building Emissions and 16.5% of 20% by 2020 goal)

**Energy:** 260,525kWh

14,191 e/therms

**\$:** \$42,231

**NO<sub>x</sub>:** 498 lbs

**SO<sub>x</sub>:** 1,103 lbs

**CO:** 333 lbs

**VOCs:** 44 lbs

**PM<sub>10</sub>:** 247 lbs

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

## Municipal Green Building Policy

The built environment has a profound impact on our natural environment, economy, health and productivity. Breakthroughs in building science, technology and operations are now available to designers, builders, operators and owners who want to build green and maximize both economic and environmental performance.

The US Green Building Council developed LEED (Leadership in Energy & Environmental Design) certification system is the nationally recognized standard for green building. Many cities and counties have adopted ordinances requiring new construction or major renovation of public buildings to follow LEED standards. The LEED system establishes several levels of environmental achievement from a “Certified” rating to a “Silver” rating to a “Gold” rating to a “Platinum” rating. The ratings are attained by earning LEED points in the categories of Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality and Innovation & Design Process.

The Town of Bedford should show its commitment to minimizing the short-term and long-term negative impacts construction has on the environment by considering a municipal green building policy that requires all new or renovated Town structures to be LEED Certified.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

## Municipal Energy Efficiency Purchasing Policy

Purchasing efficient products reduces energy costs without compromising quality. Local governments may obtain significant reductions in energy bills by adopting a procurement policy that sets a minimum efficiency standard for all new equipment purchased.

The Town of Bedford should propose a municipal policy in which, to the extent possible and in compliance with procurement regulations, all new municipal appliances, office equipment, electronic equipment, and HVAC infrastructure must be Energy Star compliant.

# Municipal Energy Measures

## Energy Efficient/Energy Star Appliances (6)

ENERGY STAR is a partnership between the U.S. Environmental Protection Agency and industry to voluntarily label products that meet more stringent energy efficiency criteria. According to the EPA, more than 2 billion ENERGY STAR-certified products have been purchased since 1992, generating utility bill savings of \$14 billion in 2006, saving an amount of energy equivalent to the generation capacity of 70 power plants. These energy savings translate to a GHG emissions reduction of 37 million metric tons, equal to removing 25 million vehicles from the road.

The Town of Bedford should consider the adoption and implementation of a Municipal Green Procurement Policy, in which newly purchased items are considered for the greatest energy efficiency possible. While purchasing appliances, the Town of Bedford should look for the ENERGY STAR label.

This measure includes data for Energy Efficient Computers, Printers, Refrigerators, Vending Machines, Water Coolers and Copiers.

**Total Cost:** \$5,190

**Co-Benefits:** 

### Total Annual Reductions

**CO<sub>2</sub>e:** 28 tonnes

**Energy:** 76,102 kWh

**\$:** \$7,610 annual savings

**NOx:** 76 lbs

**SOx:** 320 lbs

**CO:** 79 lbs

**VOCs:** 9 lbs

**PM10:** 69 lbs

### 1. Computers

Switching to Energy Star monitors and computers use 20-60% less energy than conventional systems.

**Cost:** \$0 (\$0 additional cost per unit)

**Payback:** 0 years

#### Scope

86 Computers Replaced with Energy Star Computers

### Annual Reductions

**CO<sub>2</sub>e:** 15 tonnes

**Energy:** 39,302 kWh

**\$:** \$3,930

### 2. Printers

New Energy Star qualified printers are, on average, 37% more energy efficient than conventional ones. They reduce paper consumption by printing double-sided pages and air conditioning costs by running cooler. A new energy efficient printer yields 28% savings in energy and maintenance costs.

**Cost:** \$3,550 (\$50 additional cost per unit)

**Payback:** 1.8 years

#### Scope

71 Printers

### Annual Reductions

**CO<sub>2</sub>e:** 7 tonnes

**Energy:** 19,291 kWh

**\$:** \$1,929

**Cost:** \$800 (\$100 additional cost per unit)

**Payback:** 2.2 years

### Scope

8 Refrigerators replaced

### Annual Reductions

**CO<sub>2</sub>e:** 1 tonne

**Energy:** 3,712 kWh

**\$:** \$371

## 3. Refrigerators

Refrigerators are usually the single biggest electricity user in a home and a significant user at the workplace. ENERGY STAR refrigerators use half the energy of those made before 1993, 40% less than refrigerators made in 2001, and 15% less than required by federal regulation in 2007.

**Cost:** \$0 additional cost per unit

**Payback:** 0 years

### Scope

2 Vending Machines replaced

### Annual Reductions

**CO<sub>2</sub>e:** 1 tonne

**Energy:** 3,318 kWh

**\$:** \$332

## 4. Vending Machines

As contracts with vendor operators come up for renewal, local governments can negotiate new contracts that include more energy efficient machines that will reduce GHG emissions and cost less to operate. Switching to just one ENERGY STAR-labeled vending machine can reduce municipal CO<sub>2</sub> emissions by 25,651.91 lbs over its 14-year life-cycle, equivalent to removing 3.11 cars from the road every year.

**Cost:** \$700 (\$100 additional cost per unit)

**Payback:** 2.8 years

### Scope

7 Water Coolers replaced

### Annual Reductions

**CO<sub>2</sub>e:** 1 tonne

**Energy:** 2,527 kWh

**\$:** \$253

## 5. Water Coolers

The office water cooler can use more electricity than a full-size refrigerator. An ENERGY STAR water cooler reduces this energy use by 50%. An ENERGY STAR hot and cold water cooler can save \$47 a year in energy, and a cold cooler can save \$12 a year. (Coolers that produce both hot and cold water use more energy and offer more potential for savings).

**Cost:** \$140 (\$10 additional cost per unit)

**Payback:** < 1 year

### Scope

14 Copiers replaced

### Annual Reductions

**CO<sub>2</sub>e:** 3 tonnes

**Energy:** 7,952 kWh

**\$:** \$795

## 6. Copiers

Today, there are over 220 million imaging equipment units, such as fax machines and copiers, in US buildings. Together, these units consume 40 billion kWh each year, roughly 2% of US building sector electricity consumption. These are often the most energy-intensive type of office equipment because they are left on for long periods of time — in some case, 24 hours per day. Models that meet the revised ENERGY STAR imaging equipment criteria will be more efficient and save users money over the lifetime of the product.

# Municipal Energy Measures

## Heating and Cooling Efficiency (5 Measures)

Energy used to heat, cool, and ventilate contributes to the majority of energy used in buildings. Improving the efficiency of the equipment used for these tasks reduces emissions and saves on climatization costs. Upgrading to the most efficient chillers, boilers, heating, ventilation, and air conditioning (HVAC) units and performing proper scheduled maintenance maximizes energy savings.

The Town of Bedford should consider the adoption and implementation of a Municipal Green Procurement Policy, in which newly purchased items are considered for the greatest energy efficiency possible.

This measure includes data for High Efficiency Water Heaters, Boilers, Chillers, HVAC Fans and Heat and Power Education.

**Total Cost:** \$23,573

**Co-Benefits:**   

### Total Annual Reductions

**CO<sub>2</sub>e:** 13 tonnes

**Energy:** 17,240 kWh

1,080 e/therms

**\$:** \$2,955

**NOx:** 35 lbs

**SOx:** 73 lbs

**CO:** 22 lbs

**VOCs:** 3 lbs

**PM10:** 16 lbs

### 1. Water Heaters

When Energy Star water heaters are purchased as a part of a broader energy efficiency program, a significant reduction in electricity, fuel oil and natural gas use can be realized. Communities with fossil fuel power plants within their airshed could contribute to the reduction of criteria air pollutants created from electricity generation through such a program. An Energy Star water heater can help reduce energy costs for the facility.

**Cost:** \$5,500 (\$1,100 additional cost per unit)

**Payback:** 8.8 years

#### Scope

5 Water Heaters replaced

### Annual Reductions

**CO<sub>2</sub>e:** 3 tonnes

**Energy:** 2,870 kWh

296 e/therms

**\$:** \$624

### 2. Boiler Efficiency

When Energy Star boilers are purchased as a part of a broader energy efficiency program, a significant reduction in electricity, fuel oil and natural gas use can be realized. Whether gas or oil, ENERGY STAR qualified boilers use about 6% less energy than a standard boiler. They achieve greater efficiency with improved features, such as electric ignition, which eliminates the need to have the pilot light burning all the time, and new combustion technologies that extract more heat from the same amount of fuel.

**Cost:** \$14,263 (\$0.36 additional cost of efficient boilers per sq. ft.)

**Payback:** 15.9 years

#### Scope

39,620 Square ft. of Facilities with Upgraded Boilers

### Annual Reductions

**CO<sub>2</sub>e:** 4 tonnes

**Energy:** 784 e/therms

**\$:** \$894

**Cost:** \$3,600 (\$0.36 additional cost of efficient chillers per sq. ft.)

**Payback:** 3.5 years

### Scope

10,000 sq ft of facilities with upgraded chillers

### Annual Reductions

**CO<sub>2</sub>e:** 4 tonnes

**Energy:** 10,230 kWh

**\$:** \$1,023 annual savings

## 3. Chiller Efficiency

Air conditioning is one of the largest energy users in commercial buildings. Replacing older chillers with appropriately-sized and the most efficient, new chillers can reduce energy use by 30%.

**Cost:** \$200 (\$0.02 additional cost of efficient fans per sq. ft.)

**Payback:** < 1 year

### Scope

10,000 sq ft of facilities with upgraded HVAC fans

### Annual Reductions

**CO<sub>2</sub>e:** 2 tonnes

**Energy:** 4,140 kWh

**\$:** \$414

## 4. HVAC Fan Upgrades

HVAC fans, with the help of pumps, transfer heated or cooled air into homes or buildings. When efficient HVAC are purchased as a part of a broader energy efficiency program, a significant reduction in electricity, fuel oil and natural gas use can be realized.

### Scope

Not unavailable

## 5. Combined Heat and Power Infrastructure Education

Combined heat and power (CHP), also known as cogeneration, is the simultaneous production of electricity and heat from a single fuel source, such as: natural gas, biomass, biogas, coal, waste heat, or oil.

CHP is the sequential production and use of electricity and thermal energy from a single fuel. CHP is inherently more efficient than separate generation of electricity from central station power plants and thermal energy from boilers or other heating equipment.

# Municipal Energy Measures

## Efficient Lighting Retrofits

Lighting is typically the largest electricity user in commercial buildings. Many municipal buildings use fluorescent lighting, which is relatively efficient, but many buildings still have older fixtures with magnetic ballasts and T-12 size fluorescent tubes. New electronic ballasts with T-8 size tubes use 30% less energy and can provide better light quality without flicker.

The Town of Bedford should identify lighting inefficiencies in town owned buildings and install more energy efficient lighting where necessary.

**Total Cost:** \$18,621 (\$0.47 additional cost of retrofit \$/sq. ft.)

**Payback:** 5.7 years

**Co-Benefits:**   

### Scope

39,620 sq. ft. retrofitted with efficient lighting

### Annual Reductions

**CO<sub>2</sub>e:** 12 tonnes

**Energy:** 32,782 kWh

**\$:** \$3,278

**NO<sub>x</sub>:** 33 lbs

**SO<sub>x</sub>:** 138 lbs

**CO:** 34 lbs

**VOCs:** 4 lbs

**PM<sub>10</sub>:** 30 lbs

## Lighting Occupancy Sensors

Lighting is typically the largest electricity user in commercial buildings. Much energy is wasted by lights left on when no one is using them. Installation of lighting occupancy sensors prevent this by using sensors to detect motion in the lighted space and turning lights off if no one is present. Sensors can reduce energy use for lighting by an average of 35%. When efficient lights and sensors are purchased as a part of a broader green procurement or energy efficiency program, a significant reduction in electricity use can be realized.

The Town of Bedford should identify lighting inefficiencies in town owned buildings and facilities and install interior and exterior lighting occupancy sensors where necessary.

**Cost:** \$2,377 (\$0.06 per sq foot)

**Payback:** < 1 year

**Co-Benefits:**

**Scope**   

39,620 sq ft installed with occupancy sensors

### Annual Reductions

**CO<sub>2</sub>e:** 35 tonnes (.65% reduction in total TOB Emissions, .9% reduction in TOB Building emissions and 3.3% of 20% by 2020 goal)

**Energy:** 94,989 kWh

**\$:** \$9,499

**NO<sub>x</sub>:** 95 lbs

**SO<sub>x</sub>:** 399 lbs

**CO:** 99 lbs

**VOCs:** 11 lbs

**PM<sub>10</sub>:** 87 lbs

**Total Cost:** \$375,000 (before incentives)

\$120,000 (after State incentives)

**Payback:** 60yrs (before State and Federal Incentives)

20 yrs (after State Incentives)

**Co-Benefits:**    

### Scope

50 kW of PV Installed

### Annual Reductions

**CO<sub>2</sub>e:** 21 tonnes

**Energy:** 60,000 kWh

**\$:** \$6,000

**NOx:** 57 lbs

**SOx:** 241 lbs

**CO:** 60 lbs

**VOCs:** 7 lbs

**PM10:** 53 lbs

## Use Solar Photovoltaic (PV) Energy

Solar photovoltaic (PV) power harnesses sunlight to generate electricity. By substituting solar energy for fossil fuels, energy can be produced without generating GHG emissions. Solar Electric or PV systems create electricity that can be used in Municipal owned buildings to run appliances, lighting, and central air conditioning just as they would use the power from the utility's electric grid.

The Town of Bedford should examine its town owned buildings to determine the feasibility of installing Solar PV Energy. They should work with NYSEERDA (New York State Energy Research and Development Authority) tools to access information about the cost and benefits of solar electric systems, as well as technical assistance for identifying installers and inspectors.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

## Consider Solar Hot Water Systems for Town Owned Buildings

Solar Hot Water can help reduce the cost of making hot water in municipal buildings by 50-75%. Solar thermal collectors on the roof absorb the sun's heat and transfer it into a solar storage tank adjacent to your existing hot water heater with the help of a small circulating pump. Solar thermal solutions are great for buildings that may not be eligible for PV systems because they don't require as much roof space and are less expensive.

The Town of Bedford should conduct a feasibility study around the potential for use of solar hot water systems on town owned buildings.

# Community Energy Measures

## Financing for Residential Energy Efficiency Retrofits

Most homes—even some newer ones—have not been constructed or tested to building performance standards that conserve energy. Many homes in Bedford are wasting considerable amounts of energy and money and are contributing unnecessary greenhouse gasses to the environment.

The CAP recommends that the Town of Bedford form a Finance program, that would offer property owners the option to secure low cost funds to obtain home energy audits and install recommended energy efficiency measures in their buildings and homes. Building owners would pay for the cost over a 20-year period through a special tax collected on their property tax bill. These programs would allow the town to secure the loan by recording a Special Municipal Property Lien against the property. The Lien secures the owner's obligation to pay the special taxes and secures a pool of lending capital. A key element of the programs is that they allow the transfer of the loan payments to succeeding property owners, in essence, matching the cost of the energy improvements with the energy savings. The goal of the program is to facilitate energy efficiency retrofits in Bedford's existing residential housing stock to produce 30%+ energy savings throughout the community.

**Cost:** \$54,366,000

**Household Cost:** \$8,500

**Payback:** Avg 5.4 years

**Co-Benefits:**    

### Scope

100% of 6396 homes

### Annual Reductions

**CO<sub>2</sub>e:** 46,257 tonnes in Residential GHG emissions. (32% reduction in Residential Emissions and a 17% reduction in total Community Emissions. 83.8% of 20% by 2020 goal.)

**Energy:** 27,521,348 kWh  
6,426,061 e/therms

**\$:** \$10,077,845

**NO<sub>x</sub>:** 135,345 lbs

**SO<sub>x</sub>:** 119,781 lbs

**CO:** 56,528 lbs

**VOCs:** 9,161 lbs

**PM<sub>10</sub>:** 28,590 lbs

## Community Scale Renewable Energy

Renewable energy - energy generated by natural resources - contributes little or no greenhouse gasses (GHG) to the atmosphere, reduces unhealthy by-products of burning fossil fuels and helps us reduce the need to import energy fuels from overseas. Renewable energy sources include: solar, wind, hydroelectric, and geothermal.

If the Town of Bedford community purchased 100% renewable energy from conventional sources, such as those currently available through your utility, the cost would amount to over 13.8 million annually. The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should commence a study to identify all available renewable energy assets in the community as well as opportunity sites where RE projects might best be implemented to bring this cost down. In addition, the study would include potential finance options. The results of this study could allow us to move toward increasing renewable energy production locally, bring down the incremental cost of using renewable energy, and ultimately move to 100% renewable energy use by 2020.

**Cost:** \$13,886,000 (\$0.10 per kWh additional cost)

**Payback:** Not available

**Co-Benefits:**    

### Scope

100% RE Purchased

### Annual Reductions

**CO<sub>2</sub>e:** 51,753 tonnes (18.75% reduction in total Community Emissions and 93.8% of 20% by 2020 goal)

**NO<sub>x</sub>:** 138,168 lbs

**SO<sub>x</sub>:** 582,667 lbs

**CO:** 144,695 lbs

**VOCs:** 16,247 lbs

**PM<sub>10</sub>:** 127,615 lbs

**Cost:** \$7,065,000 (\$3.20 per sq foot)

**Payback:** 3.7 years

**Co-Benefits:**    

### Scope

100% of 2.2mm sq/ft of commercial space - 30% savings

### Annual Reductions

**CO<sub>2</sub>e:** 7702 tonnes (2.7% reduction in total Community Emissions and 19.1% reduction in Commercial Emissions and 13.9% of 20% by 2020 goal)

**Energy:** 13,631,124 kWh

**\$:** \$1,896,574

**NO<sub>x</sub>:** 21,425 lbs

**SO<sub>x</sub>:** 57,509 lbs

**CO:** 16,232 lbs

**VOCs:** 2,027 lbs

**PM<sub>10</sub>:** 12,767 lbs

## Energy Efficiency Retrofits of Existing Commercial Facilities

Buildings account for 68% of total energy use and the resulting GHG emissions in Bedford. Many measures can be applied to existing buildings to improve their efficiency, including using efficient lightbulbs and fixtures, increasing insulation, replacing windows, and upgrading HVAC systems for 15-40% energy savings.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with Bedford's commercial and industrial sectors to inform them about New York State Energy Research and Development Authority's (NYSERDA) programs that provide energy efficiency services for existing buildings, new construction, industrial facilities. NYSERDA programs include: Commercial Energy Audits ([http://www.nyserdera.org/programs/Technical\\_Assistance/default.asp](http://www.nyserdera.org/programs/Technical_Assistance/default.asp)), the New Construction Program, Existing Facilities Program, New Renewable, Clean Energy, or Energy Efficiency Product Manufacturing Business Incentive and the New York Energy \$mart<sup>SM</sup> Loan Program.

**Cost:** \$704,000 (1,000 per Business)

**Payback:** < 1 year

**Co-Benefits:**    

### Scope

704 Businesses Participating

### Annual Reductions

**CO<sub>2</sub>e:** 3,965 tonnes

**Energy:** 6,818,240 kWh

254,144 e/Therms

**\$:** \$971,548

**NO<sub>x</sub>:** 11,054 lbs

**SO<sub>x</sub>:** 28,779 lbs

**CO:** 8,206 lbs

**VOCs:** 1,033 lbs

**PM<sub>10</sub>:** 6,396 lbs

## Energy Efficiency Education for Businesses

Businesses, and particularly small businesses, represent a significant portion of energy use in our community. Businesses can enact many simple measures to save energy. Outreach and education programs that offer information about and encourage conservation measures can tap into this potential.

California's "Flex Your Power" program gives awards to recognize businesses showing leadership in energy efficiency and provides information on available incentives and best practice guides by industry. For more information, see: <http://www.fypower.org/com>.

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should develop and implement a technical assistance program targeted at the commercial and industrial sectors around energy efficiency and conservation, including: promotional materials, web resources, best practices sharing, training workshops and expert support. Businesses that show leadership in energy efficiency should be recognized.

# Community Energy Measures

## Require Home Energy Rating (HERs) at Time of Sale

Buildings account for 68% of total energy use and the resulting GHG emissions in Bedford. Many measures can be applied to existing buildings to improve their efficiency, including using efficient lightbulbs and fixtures, increasing insulation, air sealing and upgrading HVAC systems but currently Bedford lacks a standard to compare the relative building performance of our residential stock.

A HERs energy rating provides a standardized evaluation of a home's energy efficiency and expected energy use costs. The evaluation is conducted in accordance with uniform standards and includes a detailed home energy use assessment, conducted by a certified Rater, using an advanced set of nationally accredited energy and economic analysis procedures and verified software tools.

The HERs Index is a scoring system established by the Residential Energy Services Network (RESNET) in which a home built to the specifications of the HERs Reference Home (based on the 2006 International Energy Conservation Code) scores a HERS Index of 100, while a net zero energy home scores a HERs Index of 0. The lower a home's HERs Index, the more energy efficient it is in comparison to the HERs Reference Home.

In an effort to allow our residents to make informed decisions on where to invest in efficiency and which homes perform with more efficiency, the Town of Bedford should consider a local ordinance requiring that every home or apartment building sold or transferred in Bedford must obtain a Home Energy Rating (HERs) by 2015 and disclose this rating to any potential buyer of said structures. Retrofits to improve the performance of a building would be eligible for financing through the Sustainable Loan Program.

**Cost:** \$500,000 (\$500 per household)

**Payback:** Not available

**Co-Benefits:**    

### Scope

1000 home transactions in 10yrs

**Total Cost:** \$0  
**Payback:** 0 years  
**Co-Benefits:**    

### Scope

500 Homes weatherized

### Annual Reductions

**CO<sub>2</sub>e:** 1,206 tonnes  
**Energy:** 718,500 kWh  
167,450 e/therms  
**\$:** \$262,743  
**NO<sub>x</sub>:** 3,528 lbs  
**SO<sub>x</sub>:** 3,127 lbs  
**CO:** 1,474 lbs  
**VOCs:** 239 lbs  
**PM<sub>10</sub>:** 746 lbs

## Promote Existing Home Weatherization Programs to Low Income Households and Seniors

A program to help low-income earners weatherize is a win-win opportunity to reduce emissions while saving money for low-income residents. A weatherization program can reduce energy costs, creating more income to be spent on necessities while, at the same time, reducing GHG emissions due to decreased energy use.

While low-income earners generally have smaller houses and fewer appliances than higher-income earners, their homes are often older and poorly insulated. Low-income weatherization programs seal cracks around windows and doors, add insulation, and sometimes replace inefficient appliances, reducing energy-use-related GHG emissions and lowering utility bills.

Helping low-income households save money on energy bills, can help improve residents' quality of life and the affordability of our community, as well as stimulate the local economy by providing residents extra money to spend on education, leisure or savings.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with qualified low-income and senior residents to promote and increase participation in existing free assistance programs offered by Westchester County and New York State.

# Community Energy Measures

## Bedford Residential Building Energy Code

Buildings account for 68% of GHG emissions in Bedford. Design and construction of new buildings, or major renovation of existing ones, provides an opportunity to implement energy saving measures that reduce GHG emissions. Green building design looks at buildings as a complete system to maximize health, comfort, and productivity of occupants while minimizing resource use for construction and operation

A New York ENERGY STAR labeled home uses approximately 30% less energy than conventionally built homes. These savings come from a variety of energy-saving features, doors, high-efficiency heating and cooling systems, and energysaving appliances and lighting. New York ENERGY STAR labeled homes must pass a stringent evaluation, including a computerbased energy analysis, inspections, and certification testing.

The Town of Bedford should consider legislation requiring all new residential dwellings and all renovated residential dwellings where changes are equal or exceed 50% of the dwelling's existing conditioned area to be built to comply with the current New York ENERGY STAR labeled homes requirements. Under this energy code, all applicants seeking a Building Permit for a new subject dwelling shall submit a Town of Bedford New York ENERGY STAR Building Permit affidavit. Special consideration must be given to Bedford's historic building stock to be consistent with historical preservation laws and codes and to ensure that recommended measures achieve the greatest energy savings with the least alteration to the historic building.

**Cost:** \$4000 increased building cost per household

**Payback:** 2.5 years

**Co-Benefits:**    

### Scope

225 new housing units

### Annual Reductions

**CO<sub>2</sub>e:** 1,628 tonnes

**Energy:** 970,178 kWh

226,058 e/therms

**\$:** \$354,723

**NOx:** 4,763 lbs

**SOx:** 4,222 lbs

**CO:** 1,991 lbs

**VOCs:** 322 lbs

**PM<sub>10</sub>:** 1,008 lbs

**Cost:** \$4.00 Increased Building  
Cost (\$ per square foot)

**Payback:** 6.3 years

**Co-Benefits:**    

### Scope

50,000 sq. ft. of new construc-  
tion or renovation

### Annual Reductions

**CO<sub>2</sub>e:** 124 tonnes

**Energy:** 259,500 kWh  
4,950 e/therms

**\$:** \$31,593

**NO<sub>x</sub>:** 341 lbs

**SO<sub>x</sub>:** 1,092 lbs

**CO:** 292 lbs

**VOCs:** 35 lbs

**PM<sub>10</sub>:** 241 lbs

## Bedford Commercial Building Energy Code

The built environment has a profound impact on our natural environment, economy, health and productivity. Breakthroughs in building science, technology and operations are now available to designers, builders, operators and owners who want to build green and maximize both economic and environmental performance.

The US Green Building Council developed LEED (Leadership in Energy & Environmental Design) certification system is the nationally recognized standard for green building. Many cities and counties have adopted ordinances requiring new construction or major renovation of public buildings follow LEED standards. The LEED system establishes several levels of environmental achievement from a “Certified” rating to a “Silver” rating to a “Gold” rating to a “Platinum” rating. The ratings are attained by earning LEED points in the categories of Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality and Innovation & Design Process.

The Town of Bedford should demonstrate its commitment to minimizing the short-term and long-term negative impacts construction has on the environment by proposing legislation requiring all new or renovated subject structures (excluding single family units) equal to or greater than 5,000 square feet of conditioned area to be Certified LEED.

The intent of this legislation is to provide owners and occupants of commercial buildings and offices, industrial buildings, and multiple residences of greater than 4 units with the economic benefits of energy and water savings, good indoor air quality and healthy, pleasant and productive surroundings. A further intent of this article is to benefit the community by having buildings constructed that are resource-efficient and conserve energy.

# Community Energy Measures

## Energy Efficient/Energy Star Appliances (7)

ENERGY STAR is a partnership between the U.S. Environmental Protection Agency and industry to voluntarily label products that meet more stringent energy efficiency criteria. According to the EPA, more than 2 billion ENERGY STAR-certified products have been purchased since 1992, generating utility bill savings of \$14 billion in 2006, saving an amount of energy equivalent to the generation capacity of 70 power plants. These energy savings translate to a GHG emissions reduction of 37 million metric tons, equal to removing 25 million vehicles from the road.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work to educate the residents of Bedford on the merits of purchasing and using ENERGY STAR appliances in place of older appliances.

**Total Cost:** \$1,083,290

**Co-Benefits:**   

### Total Annual Reductions

**CO<sub>2</sub>e:** 4,651 tonnes

**Energy:** 11,889,923 kWh

**\$:** \$1,233,691

**NOx:** 12,417 lbs

**SOx:** 45,445 lbs

**CO:** 12,559 lbs

**VOCs:** 1,427 lbs

**PM10:** 10,947 lbs

### 1. Computers

Switching to Energy Star monitors and computers use 20-60% less energy than conventional systems.

**Cost:** \$0 additional cost per unit

**Payback:** 0 years

### Scope

11,158 Computers Replaced

### Annual Reductions

**CO<sub>2</sub>e:** 1,900 tonnes

**Energy:** 5,099,206 kWh

**\$:** \$509,921

### 2. Printers

New Energy Star qualified printers are, on average, 37% more energy efficient than conventional ones. They reduce paper consumption by printing double-sided pages and air conditioning costs by running cooler. A new energy efficient printer yields 28% savings in energy and maintenance costs.

**Cost:** \$55,790 (\$10 additional cost/unit)

**Payback:** < 1 year

### Scope

5,579 Printers

### Annual Reductions

**CO<sub>2</sub>e:** 521 tonnes

**Energy:** 1,396,703 kWh

**\$:** \$139,670

### 3. Refrigerators

Refrigerators are usually the single biggest electricity user in a home and a significant user at the workplace. ENERGY STAR refrigerators use half the energy of those made before 1993, 40% less than refrigerators made in 2001, and 15% less than required by federal regulation in 2007.

**Cost:** \$975,000 (\$100 additional cost/unit)

**Payback:** 2.2 years

### Scope

9,750 Refrigerators

### Annual Reductions

**CO<sub>2</sub>e:** 1,686 tonnes

**Energy :** 4,524,000 kWh

**\$:** \$452,400

**Cost:** \$0 additional cost per unit  
**Payback:** 0 years

**Scope**  
5,200 Dishwashers

**Annual Reductions**  
**CO<sub>2</sub>e:** 422 tonnes  
**Energy:** 543,514 kWh  
39,208 e/therms  
**\$:** \$99,050  
**Gallons of water:** 2,236,000

## 4. Dishwashers

Energy Star rated dishwashers consume less water as well as less energy than traditional dishwashers. As part of a water conservation program, efficient dishwashers can help reduce the amount of water used and sewer water needed to be treated.

**Cost:** \$0 additional cost per unit  
**Payback:** 0 years

**Scope**  
100 Vending Machines

**Annual Reductions**  
**CO<sub>2</sub>e:** 62 tonnes  
**Energy:** 165,900 kWh  
**\$:** \$16,590

## 5. Vending Machines

As contracts with vendor operators come up for renewal, businesses can negotiate new contracts that include more energy efficient machines that will reduce GHG emissions and cost less to operate. Switching to just one ENERGY STAR-labeled vending machine can reduce a company's CO<sub>2</sub> emissions by 25,651.91 lbs over its 14-year lifecycle, equivalent to removing 3.11 cars from the road every year.

**Cost:** \$50,000 (\$10 additional cost/unit)  
**Payback:** 4.9 years

**Scope**  
500 Water Coolers

**Annual Reductions**  
**CO<sub>2</sub>e:** 38 tonnes  
**Energy:** 102,000 kWh  
**\$:** \$10,200

## 6. Water Coolers

The office water cooler can use more electricity than a full-size refrigerator. An ENERGY STAR water cooler reduces this energy use by 50%. An ENERGY STAR hot and cold water cooler can save \$47 a year in energy, and a cold cooler can save \$12 a year. (Coolers that produce both hot and cold water use more energy and offer more potential for savings).

**Cost:** \$2,500 (\$10 additional cost/unit)  
**Payback:** < 1 year

**Scope**  
250 Copiers

**Annual Reductions**  
**CO<sub>2</sub>e:** 22 tonnes  
**Energy:** 58,600 kWh  
**\$:** \$5,860

## 7. Copiers

Today, there are over 220 million imaging equipment units, such as fax machines and copiers, in US buildings. Together, these units consume 40 billion kWh each year, roughly 2% of US building sector electricity consumption. These are often the most energy-intensive type of office equipment because they are left on for long periods of time — in some case, 24 hours per day. Models that meet the revised ENERGY STAR imaging equipment criteria will be more efficient and save users money over the lifetime of the product.

# Community Energy Measures

## Heating and Cooling Efficiency (6 Measures)

Energy used to heat, cool, and ventilate contributes to the majority of energy used in buildings. Improving the efficiency of the equipment used for these tasks reduces emissions and saves on climatization costs. Upgrading to the most efficient chillers, boilers, heating, ventilation, and air conditioning (HVAC) units and performing proper scheduled maintenance maximizes energy savings.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work to educate the residents of Bedford on the merits of energy efficient heating and cooling equipment.

**Total Cost:** \$8,404,689

**Co-Benefits:**   

### Total Annual Reductions

**CO<sub>2</sub>e:** 3,821 tonnes

**Energy:** 2,955,270 kWh

**\$:** \$849,127

**NOx:** 11,099 lbs

**SOx:** 12,725 lbs

**CO:** 5,184 lbs

**VOCs:** 794 lbs

**PM10:** 2,964 lbs

### 1. Water Heaters

When Energy Star water heaters are purchased as a part of a broader energy efficiency program, a significant reduction in electricity, fuel oil and natural gas use can be realized. Communities with fossil fuel power plants within their airshed could contribute to the reduction of criteria air pollutants created from electricity generation through such a program. An Energy Star water heater can help reduce energy costs for the facility.

**Cost:** \$7,521,593 (\$1,012 additional cost per unit)

**Payback:** 9.7 years

### Scope

6,761 Water Heaters Replaced

### Annual Reductions

**CO<sub>2</sub>e:** 3,488 tonnes

**Energy:** 2,716,570 kWh  
441,899 e/therms

**\$:** \$775,422

### 2. Boiler Efficiency

When Energy Star boilers are purchased as a part of a broader energy efficiency program, a significant reduction in electricity, fuel oil and natural gas use can be realized. Whether gas or oil, ENERGY STAR qualified boilers use about 6% less energy than a standard boiler. They achieve greater efficiency with improved features, such as electric ignition, which eliminates the need to have the pilot light burning all the time, and new combustion technologies that extract more heat from the same amount of fuel.

**Cost:** \$794,818 (\$0.36 additional cost of efficient boilers per sq. ft.)

**Payback:** 15.9 years

### Scope

2,207,827 sq ft of facilities upgraded with new boilers

### Annual Reductions

**CO<sub>2</sub>e:** 245 tonnes

**Energy:** 43,715 e/therms

**\$:** \$49,835

**Cost:** \$36,000 (\$0.36 additional cost of efficient boilers per sq. ft.)

**Payback:** 3.5 years

### Scope

100,000 sq ft of facilities upgraded with energy efficient chillers

### Annual Reductions

**CO<sub>2</sub>e:** 38 tonnes

**Energy :** 102,300 kWh

**\$:** \$10,230

## 3. Chiller Efficiency

Air conditioning is one of the largest energy users in commercial buildings. Replacing older chillers with appropriately-sized and the most efficient, new chillers can reduce energy use by 30%.

**Cost:** \$50,000 (\$50 additional cost/unit)

**Payback:** 5.3 years

### Scope

1000 Window Air Conditioners

### Annual Reductions

**CO<sub>2</sub>e:** 35 tonnes

**Energy:** 95,000 kWh

**\$:** \$9,500

## 4. Room Air Conditioners

Nationwide, room air conditioners consume 22 billion kWh of electricity a year. ENERGY STAR air conditioners use about 10% less energy than new non-ENERGY STAR units. If the air conditioner you are replacing is an older model, the savings can be much greater. A new ENERGY STAR unit can use half the energy of an air conditioner made in the 1970s. To save the most energy, look for the air conditioner with an Energy Star rating and the highest energy efficiency rating (EER).

**Cost:** \$2,000 (\$0.02 additional cost of efficient fans per sq ft)

**Payback:** < 1 years

### Scope

100,000 sq ft of facilities upgraded with energy efficient HVAC fans

### Annual Reductions

**CO<sub>2</sub>e:** 15 tonnes

**Energy:** 41,400 kWh

**\$:** \$4,140

## 5. HVAC Fan Upgrades

HVAC fans, with the help of pumps, transfer heated or cooled air into homes or buildings. When efficient HVAC are purchased as a part of a broader energy efficiency program, a significant reduction in electricity, fuel oil and natural gas use can be realized.

### Scope

data unavailable

## 6. Combined Heat & Power Infrastructure Education

Combined heat and power (CHP), also known as cogeneration, is the simultaneous production of electricity and heat from a single fuel source, such as: natural gas, biomass, biogas, coal, waste heat, or oil. CHP is the sequential production and use of electricity and thermal energy from a single fuel. CHP is inherently more efficiency than separate generation of electricity from central station power plants and thermal energy from boilers or other heating equipment.

# Community Energy Measures

## Compact Fluorescent Light Bulb (CFL) Distribution

Installing compact fluorescent light bulbs (CFLs) is one of the simplest and most cost-effective energy saving measures people can take in their homes. CFLs use about 75% less energy than incandescent bulbs, according to the U.S. Department of Energy. If every home in the U.S. replaced an incandescent bulb with a CFL bulb in just one light fixture, the country would save more than \$600 million in energy costs per year, reducing GHG emissions by the equivalent of removing 800,000 cars from the road.

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should encourage community members to purchase CFLs for their homes by holding promotional CFL giveaway days, in which residents take home a free CFL bulb. This raises awareness of the benefits of CFLs, encouraging participants and their neighbors to buy additional bulbs on their own. They should also explore additional ways of offering free or discounted CFLs to residents, work to promote safe and proper recycling and explore additional local recycling sites.

**Cost:** \$2,580 (\$2.50 per CFL)

**Payback:** 0.5 years

**Co-Benefits:**   

### Scope

1,000 lightbulbs exchanged for CFLs

### Annual Reductions

**CO<sub>2</sub>e:** 16 tonnes

**Energy:** 44,000 kWh

**\$:** \$4,814

**NO<sub>x</sub>:** 44 lbs

**SO<sub>x</sub>:** 185 lbs

**CO:** 46 lbs

**VOCs:** 5 lbs

**PM<sub>10</sub>:** 40 lbs

## Efficient Lighting Retrofits for Non-Residential Buildings

Artificial lighting consumes almost 15% of a household's electricity use and is typically the largest electricity user in commercial buildings. Lighting technologies can reduce lighting energy use by selecting lighting and sources that use energy more efficiently, and by installing lighting controls.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work on outreach and education on the merits of installing energy efficient lighting in all non residential buildings.

**Cost:** \$1,037,678 (\$0.47 per sq ft)

**Payback:** 3.3 years

**Co-Benefits:**   

### Scope

2,207,827 sq ft retrofitted with efficient lighting

### Annual Reductions

**CO<sub>2</sub>e:** 1,184 tonnes

**Energy:** 3,175,959 kWh

**\$:** \$317,596

**NO<sub>x</sub>:** 3,160 lbs

**SO<sub>x</sub>:** 13,326 lbs

**CO:** 3,309 lbs

**VOCs:** 372 lbs

**PM<sub>10</sub>:** 2,919 lbs

**Cost:** \$132,469 (\$0.06 per sq. ft.)

**Payback:** < 1 year

**Co-Benefits:**   

### Scope

2,207,827 sq ft installed with occupancy sensors

### Annual Reductions

**CO<sub>2</sub>e:** 1973 tonnes (.71% reduction in total Community Emissions and 3.6% of 20% by 2020 goal)

**Energy (annually):** 5,293,265 kWh

**\$:** \$529,327

**NOx:** 5,267 lbs

**SOx:** 22,211 lbs

**CO:** 5,516 lbs

**VOCs:** 619 lbs

**PM10:** 4,865 lbs

## Lighting Occupancy Sensors for Non-Residential Buildings

Lighting is typically the largest electricity user in commercial buildings. Much energy is wasted by lights left on when no one is using them. Installation of lighting occupancy sensors prevent this by using sensors to detect motion in the lighted space and turning lights off if no one is present. Sensors can reduce energy use for lighting by an average of 35%. When efficient lights and sensors are purchased as a part of a broader green procurement or energy efficiency program, a significant reduction in electricity use can be realized.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work on outreach and education on the merits of installing lighting occupancy sensors in all non-residential buildings.

**Cost:** \$7,500 (\$7.50 per LED light string)

**Payback:** 5 years

**Co-Benefits:**   

### Scope

1000 strings of LED lights

### Annual Reductions

**CO<sub>2</sub>e:** 6 tonnes

**Energy:** 15,000 kWh

**\$:** \$1,500

**NOx:** 15 lbs

**SOx:** 63 lbs

**CO:** 16 lbs

**VOCs:** 2 lbs

**PM10:** 14 lbs

## LED Holiday Lights

LED holiday lights use up to 95% less energy than incandescent lights. Each bulb in a light string is small, but together, with several strings per home, they can draw a lot of energy. One string can use 150 watts, or 16 kWh over the holiday season, while an LED string will use less than 1 kWh.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with Bedford's residential and commercial sectors on outreach and education on the merits of installing LED holiday lights.

# Community Energy Measures

## Solar Photovoltaic (PV) Energy

Solar photovoltaic (PV) power harnesses sunlight to generate electricity. By substituting solar energy for fossil fuels, energy can be produced without generating GHG emissions. Solar Electric or PV systems create electricity that can be used in your home or business to run your appliances, lighting, and central air conditioning just as you would use the power from your utility's electric grid.

NYSERDA (New York State Energy Research and Development Authority) has several tools to help inform consumers about costs, installation and incentives.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should develop education and outreach opportunities to encourage installation of Solar PV systems on community buildings.

**Cost:** \$13,475,000 (\$7,000 per kW)  
(before incentives)

\$6,737,000 (after State incentives)  
\$2,694,000 (after State and Federal Incentives)

**Payback:** 60 years (before State incentives)

12 years (after State incentives)

**Co-Benefits:**    

### Scope

1,925 kW of PV Installed

### Annual Reductions

**CO<sub>2</sub>e:** 825 tonnes

**Energy:** 2,220,000 kWh

**\$:** \$222,000

**NOx:** 2,202 lbs

**SOx:** 9,287 lbs

**CO:** 2,306 lbs

**VOCs:** 259 lbs

**PM10:** 2,034 lbs

## Solar Hot Water

Solar Hot Water can help reduce the cost of making hot water in your home or business by 50-75%. Solar thermal collectors on the roof absorb the sun's heat and transfer it into a solar storage tank adjacent to your existing hot water heater with the help of a small circulating pump.

Solar thermal solutions are great for homeowners that may not be eligible for PV systems because they don't require as much roof space and are less expensive. Although state rebates are not applicable to solar thermal systems, both Federal and State Tax Credits are available. A 25% state tax credit (capped at \$5,000) and a 30% federal tax credit (with no cap) are available for homeowners in NY.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should develop education and outreach opportunities to encourage installation of solar hot water systems on residential and commercial buildings.

**Cost:** \$1,365,000 (\$2,100 per home)

**Payback:** 14 years

**Co-Benefits:**    

### Scope

650 Homes

### Annual Reductions

**CO<sub>2</sub>e:** 454 tonnes

**Energy:** 211,413 kWh  
66,985 e/therms

**\$:** \$97,504

**NOx:** 1,336 lbs

**SOx:** 932 lbs

**CO:** 511 lbs

**VOCs:** 87 lbs

**PM10:** 229 lbs

**Cost:** \$1,201,500 (\$1,350 per home)

**Payback:** 1.7 year

**Co-Benefits:**    

### Scope

890 Homes

### Annual Reductions

**CO<sub>2</sub>e:** 1,889 tonnes

**Energy:** 12,791,970 kWh

**\$:** \$693,481

**NOx:** 4,096 lbs

**SOx:** 53,331 lbs

**CO:** 11,102 lbs

**VOCs:** 1,022 lbs

**PM10:** 11,492 lbs

## Switch Electric Heat to Natural Gas

Energy used to heat, cool, and ventilate contributes to the majority of energy used in buildings. Using electricity for heat is only about one third as efficient as burning fuel directly for heat. Facilities with electric resistance heat can reduce emissions and save money on heating by switching to natural gas or propane, as electric heating is inherently inefficient.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should identify streets that have access to existing gas lines that would enable residents to replace electric heating systems with more efficient natural gas heating systems.

**Cost:** \$50,000 (5,000 per unit, increased building cost)

**Payback:** 7.1

**Co-Benefits:**   

### Scope

10 efficient multi-family housing units

### Annual Reductions

**CO<sub>2</sub>e:** 29 tonnes

**Energy:** 51,400 kWh,  
1,700 e/therms

**\$:** \$7,078

**NOx:** 80 lbs

**SOx:** 217 lbs

**CO:** 61 lbs

**VOCs:** 8 lbs

**PM10:** 48 lbs

## Energy Efficient Multi-Family Housing

Buildings account for 68% of GHG emissions in Bedford. Design and construction of new buildings, or major renovation of existing ones, provides an opportunity to implement energy saving measures that reduce GHG emissions. Green building design looks at buildings as a complete system to maximize health, comfort, and productivity of occupants while minimizing resource use for construction and operation

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should consider legislation that requires all new multi-family housing (greater than four family) and all renovated residential dwellings for the purposes of multi-family housing (greater than four family), where changes are equal or exceed 50% of the dwelling's existing conditioned area to be built to comply with the LEED certified requirements. Under this certification, all applicants seeking a Building Permit to build multi-family housing units shall submit to the Town of Bedford New York a LEED Building Permit affidavit.

# Community Energy Measures

## Residential Construction Feebate Program

Residential buildings are responsible for 68% of Bedford's greenhouse gas emissions, and Bedford's residents and businesses now spend at least \$25 million each year to heat, cool and power our buildings. The Town's goal to reach a 20% reduction of GHG emissions by 2020 must be achieved with an outlook on new building performance. Because buildings last for many decades, our new buildings will affect Bedford for the next century or more. Only 25% of the lifetime costs associated with a building represent construction and finance while three quarters of lifetime costs consist of energy, maintenance and fuel inputs. High performance efficient buildings offer one of the best solutions to improve environmental performance while strengthening the local economy and keeping buildings affordable in the long term.

For new residential construction projects, the program proposes a green building GHG emissions "feebate"—a market-based instrument that establishes an optimal community baseline level of CO<sub>2</sub> emissions for new buildings. This program then levies fees for new buildings with elevated GHG emissions, waives fees for those with GHG emission levels consistent with the baseline and rewards those with low GHG emissions. The feebate concept is not a "tax" and shouldn't be confused with traditional revenue raising processes. Feebate programs are crafted to be revenue neutral policy that encourages the adoption of a municipal/community goal through market-based incentives.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should explore the feasibility of a program in which all new residential buildings in Bedford are compared against a pre-determined optimal baseline level of CO<sub>2</sub> emissions. New buildings that have CO<sub>2</sub> emissions below the determined baseline level are paid a rebate; those above the determined baseline level would pay a fee.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

## Ordinance Review for Renewable Energy Installation

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should review all current town ordinances and codes and consider amending legislation that unnecessarily impedes or restricts the installation and use of renewable energy in the town.

**Cost:** \$0

**Payback:** 0 years

**Co-Benefits:**    

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

## Smart Grid

In today's electricity markets, communities that can measurably reduce electric consumption on demand, are in a position to be compensated as if they were a power plant, and sell their "reductions" into the power market. New Smart Grid infrastructure and technology will provide users of electricity with the tools to automatically manage their electricity consumption and reduce demand while offering the potential to earn compensation. Automatically turning an appliance off on a moment's notice, for a limited time, has the same effect as turning a power plant on, on a moment's notice. These developing "demand response" services have reduced the need to switch on older, inefficient and costly power plants on short notice, and reduces the need to construct new plants.

Within six to twelve months our appliance stores will carry appliances that are labeled with a "Smart Appliance" tag. The owners of these appliances will have the option to connect to the Smart Grid and will have them automatically respond to calls from the grid to reduce demand. Participating Smart Grid communities will be compensated for measurable reductions in demand. Last year, end-users and their representatives were paid more than a billion dollars to shave their electric use at "peak times", when electricity consumption was unusually heavy.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work to educate our residents and position our community to receive the maximum benefit from the regional and nationwide move to Smart Grid infrastructure.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

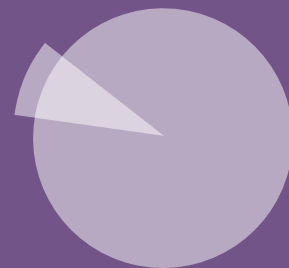
## Accelerate Permitting Process for Green Buildings

The Town of Bedford recognizes that green building design and construction have a significant impact on our greenhouse gas reduction goals and create healthier buildings for the people who live and work in our community. The town should propose that applicants seeking a Building Permit for projects that exceed existing energy efficiency codes in Bedford (i.e. building to LEED or ENERGY STAR standards), receive accelerated permit processing. Applicants must still comply with all other Town Building codes and regulations.



# c. Transportation

(8.2% of total proposed GHG reductions )



We, as a nation, have become completely reliant on our cars, trucks mini-vans and SUVs. Single occupancy vehicles provide a convenience and reliability that we have grown accustomed to for commuting, errands and trips of all length. In Bedford, transportation accounts for 27% of our greenhouse gas emissions in addition to contributing countless other pollutants to the atmosphere.

There are three principal ways to reduce the emissions from transportation vehicles in Bedford: Reduce the total number of miles traveled by switching transportation to walking, bicycling, and mass transit; shift to more fuel efficient cars by trading in larger less efficient vehicles for smaller vehicles, or purchasing hybrid electric vehicles; and switch to fuels that emit fewer pollutants.

The measures contained in this section may be the most challenging to implement, as shifting demand away from the personal vehicle and toward alternative modes of transportation are dependent upon personal choice - but, we are certain that with some community infrastructure improvements and educational components, the changes are feasible.

total GHG reduction in sector: **15,922 Tonnes CO<sub>2</sub>e**

co-benefits:



# Municipal Transportation Measures

## Use Smaller Fleet Vehicles

One easy way to improve the efficiency of vehicles is simply to use a smaller one. The smallest vehicle that can accomplish a task will usually be the most efficient. When considering a vehicle purchase, identify whether an SUV or full-size sedan is actually necessary, or whether a compact car can do the same job.

The Climate Action Plan recommends that the Town of Bedford explore the feasibility of using smaller vehicles, scooters and small electric vehicles in its municipal fleet.

**Cost:** Not available

**Co-Benefits:**    

### Scope

11 smaller vehicles

### Annual Reductions

**CO<sub>2</sub>e:** 9 tonnes

**Gasoline:** 920 gallons

**\$:** \$1,840

**NOx:** 3 lbs

**CO:** 622 lbs

**VOCs:** 65 lbs

## Electric Vehicles

Electric vehicles (EVs) run off of electricity and battery power as opposed to more traditional fuels types like gasoline and diesel fuel. EVs also use regenerative braking to capture and reuse the energy of the vehicles' momentum. They will have a major impact on our fuel reduction, and, when paired with renewable energy sources, will also greatly reduce GHG emissions.

The Town of Bedford should encourage the use of electric vehicles with "plug-in" charging stations for commuter parking lots and other high traveled areas and explore the cost of plug-in installations. Town vehicles powered by alternative technologies should be labelled as such with an appropriate logo, to promote and reinforce an energy efficiency message to the public, thereby encouraging citizens to follow the lead of the Town when buying their next vehicle.

**Cost:** \$50,000 (\$10,000 additional cost per EV)

**Payback:** 18.7 years

**Co-Benefits:**    

### Scope

5 EVs

### Annual Reductions

**CO<sub>2</sub>e:** 16 tonnes

**Energy:** -33,417 kWh

**Gasoline:** 3,011 gal.

**\$:** \$2,679

**NOx:** -24 lbs

**SOx:** -140 lbs

**CO:** 2,000 lbs

**VOCs:** 210 lbs

**PM10:** -26 lbs

**Cost:** \$45,000 (for 15 Hybrids)

**Payback:** 4.3 years

**Co-Benefits:**    

### Scope

Replace 15 conventional-powered vehicles with 15 hybrids.

### Annual Reductions

**CO<sub>2</sub>e:** 49 tonnes

**Gasoline:** 5,250 gal.

**\$:** \$10,500

**NO<sub>x</sub>:** 16 lbs

**SO<sub>x</sub>:** 1 lb

**CO:** 3,549 lbs

**VOCs:** 372 lbs

**PM<sub>10</sub>:** 8 lbs

## Hybrid Vehicles in Municipal Fleet

Hybrid/electric vehicles couple an electric drive with a gasoline engine. They are widely available and are suited for a variety of applications. Electric drivetrains are much more efficient than the drivetrains used on standard internal combustion engine vehicles. Automakers are increasingly making hybrid/electric versions of existing models available.

The Town of Bedford should set a goal to add 15 hybrids vehicles to the municipal fleet over the next ten years. Town vehicles powered by alternative technologies should be labelled as such with an appropriate logo, to promote and reinforce an energy efficiency message to the public, thereby encouraging citizens to follow the lead of the Town when buying their next vehicle.

**Cost:** \$0 additional cost

**Payback:** 0 years

**Co-Benefits:**    

### Scope

58,943 gallons per year switched from diesel to biodiesel

### Annual Reductions

**CO<sub>2</sub>e:** 46 tonnes

**NO<sub>x</sub>:** -42 lbs

**SO<sub>x</sub>:** 50 lbs

**CO:** 296 lbs

**VOCs:** 183 lbs

**PM<sub>10</sub>:** 29 lbs

## Fleet Conversion to Biodiesel (B20)

Using biodiesel in municipal fleet vehicles is a simple and effective way to achieve large reductions in CO<sub>2</sub> emissions from fleet operations. Garbage trucks, snowplows, fire trucks, maintenance vehicles, and transit buses are all good options for using biodiesel. There is no need to convert the vehicles, so there is no capital cost to the switch. Biodiesel can be used by itself (called B100 for 100% biodiesel), or mixed with petroleum diesel. A popular mix is B20, 20% biodiesel with 80% petroleum diesel.

The Town of Bedford should consider replacing a portion of its diesel supply with biodiesel for use in the town fleet where appropriate. Town vehicles powered by alternative technologies should be labelled as such with an appropriate logo, to promote and reinforce an energy efficiency message to the public, thereby encouraging citizens to follow the lead of the Town when buying their next vehicle.

# Municipal Transportation Measures

## Compressed Natural Gas (CNG) Vehicles

Natural gas is a clean-burning alternative to gasoline or diesel for municipal and private fleet vehicles. While natural gas is a fossil fuel, it has lower carbon emissions per unit of energy than gasoline or diesel.

The Town of Bedford should explore bringing the necessary infrastructure (pumping stations) to the town and encourage the addition of 5 compressed natural gas vehicles to its municipal fleet. Town vehicles powered by alternative technologies should be labelled as such with an appropriate logo, to promote and reinforce an energy efficiency message to the public, thereby encouraging citizens to follow the lead of the Town when buying their next vehicle.

**Cost:** \$2,500 (\$500 per vehicle)

**Payback:** 1.6 years

**Co-Benefits:**    

### Scope

5 vehicles

### Annual Reductions

**CO<sub>2</sub>e:** 6 tonnes

**Gasoline:** 2,667 gallons

**\$:** \$1,533

**NO<sub>x</sub>:** 4 lbs

**SO<sub>x</sub>:** 0 lbs

**CO:** 1,488 lbs

**VOCs:** 182 lbs

**PM10:** 3 lbs

## Increase Rail Transit Ridership

Rail transit is much more efficient than personal automobiles. Encouraging people to switch to taking the train for their daily commute reduces emissions and local air pollution.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should consider a transportation survey to determine commuter patterns among the town's employees. The results can assist with targeting education and encouraging the use of rail transit, where possible.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

### Scope

10 additional employees daily transit passengers

### Annual Reductions

**CO<sub>2</sub>e:** 17 tonnes

**Gasoline:** 2,388 gal.

**Energy:** -14,219 kWh

**Vehicle Miles:** 47,040 mi

**\$:** \$4,776

**NO<sub>x</sub>:** -7 lbs

**SO<sub>x</sub>:** -59 lbs

**CO:** 1,599 lbs

**VOCs:** 168 lbs

**PM10:** -10 lbs

**Cost:** Not available  
**Co-Benefits:**    

### Scope

12 employees

### Annual Reductions

**CO<sub>2</sub>e:** 1 tonne

**Vehicle Miles:** 2,880 mi.

**Gasoline:** 146 gallons

**\$:** \$292

**CO:** 99 lbs

**VOCs:** 10 lbs

## Promote Use of Public Transportation, Carpooling and Vanpooling

Using public transportation, or sharing a car or van to get to work is much more efficient than driving to work alone. The Town of Bedford should initiate incentives for those municipal employees who significantly reduce their vehicle miles traveled. Employees could reach this goal by car-pooling, van-pooling, using public transportation, and biking or walking to work. Incentives can range from free lunch once a month to cash bonuses or extra time off. In addition, their personal savings at the gas station will be significant.

**Cost:** \$0  
**Co-Benefits:**    

### Scope

24 vehicles

### Annual Reductions

**CO<sub>2</sub>e:** 27 tonnes

**Diesel:** 2,880 gallons

**\$:** \$7,200

**NOx:** 103 lbs

**SOx:** 14 lbs

**CO:** 131 lbs

**VOCs:** 42 lbs

**PM10:** 14 lbs

## Enforce Westchester County's Anti-Idling Law for Town Owned Trucks

On February 10, 2009, Westchester County adopted the Anti Idling Law to limit idling, when a vehicle is not in motion, to three consecutive minutes. This applies to all municipal vehicles with the exception of emergency vehicles and other external conditions. Idling a diesel vehicle for one hour a day is equivalent in engine wear to driving 64,000 miles and using over 500 gallons of fuel annually. Gasoline wasted while idling is the equivalent of 22 lbs of eCO<sub>2</sub> for every hour of idling. In addition there are significant health benefits to improving air quality as studied by the American Cancer Foundation and the EPA.

The Town of Bedford should enforce the anti idling restriction throughout its non-emergency municipal fleet.

**Cost:** \$1,000 cost of bike and training  
**Payback:** Not available

**Co-Benefits:**    

### Scope

3 officers on bicycles

### Annual Reductions

**CO<sub>2</sub>e:** 21 tonnes

**Gasoline:** 2,258 gallons

**\$:** \$20,400

**CO:** 1,526 lbs

**VOCs:** 160 lbs

## Police on Bicycles

Reducing the use of vehicles in government operations reduces GHG emissions. Police cars are usually heavy cars with large engines that get poor mileage and produce a large amount of GHG emissions per vehicle. Bicycles, on the other hand, produce no emissions. Police on bicycles are more approachable, better able to connect with the public, and better able to observe what is happening. Also, police on bicycles can pursue suspects in places where cars can't go.

The Town of Bedford should explore the feasibility of adding bicycles to its fleet and providing officers with the necessary training.

# Community Transportation Measures

## Use Smaller Fleet Vehicles

One easy way to improve the efficiency of vehicles is simply to use a smaller one. The smallest vehicle that can accomplish a task will usually be the most efficient. When considering a vehicle purchase, identify whether an SUV or full-size sedan is actually necessary, or whether a compact car can do the same job.

In some communities, exhaust from cars and light trucks are the single biggest cause of local air pollution. Using fuel more efficiently reduces this pollution. In addition to reducing emissions and saving on fuel costs, smaller vehicles usually have a lower price.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work to educate and inform the community about the benefits of using smaller cars and more efficient vehicles.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

### Scope

6,410 smaller vehicles replacing larger cars

### Annual Reductions

**CO<sub>2</sub>e:** 4,738 tonnes

**Gasoline:** 505,408 gal.

**\$:** \$1,006,816

**NOx:** 1,504 lbs

**SOx:** 98 lbs

**CO:** 340,315 lbs

**VOCs:** 35,690 lbs

**PM10:** 732 lbs

## Increase Ownership of Hybrid Vehicles

Hybrid/electric vehicles couple an electric drive with a gasoline engine and are widely available and are suited for a variety of applications. Electric drivetrains are much more efficient than the drivetrains used on standard internal combustion engine vehicles. Auto-makers are increasingly making hybrid/electric versions of existing models available.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work to increase ownership of hybrids by 500 vehicles over the next ten years. Currently, hybrids are the most fuel efficient cars in each size class. The Town of Bedford offers a financial incentive in its two commuter lots for owners of hybrid vehicles. Under this program, residents who own a hybrid receive a \$50 annual incentive at the time of permitting. Additional opportunities to educate Bedford residents about the benefits of hybrid vehicles, and to offer additional incentive programs to increase ownership should be explored.

**Cost:** \$1,500,000 (\$3,000 additional cost per vehicle)

**Payback:** 6.8 years

**Co-Benefits:**    

### Scope

Increase number of hybrids used by 500

### Annual Reductions

**CO<sub>2</sub>e:** 1,031 tonnes

**Gasoline:** 109,565 gal.

**\$:** \$219,130

**NOx:** 327 lbs

**SOx:** 21 lbs

**CO:** 74,068 lbs

**VOCs:** 7,768 lbs

**PM10:** 159 lbs

**Cost:** \$0 additional cost

**Payback:** 0 years

**Co-Benefits:**    

### Scope

383,250 gallons per year switched from diesel to biodiesel (B20)

### Annual Reductions

**CO<sub>2</sub>e:** 300 tonnes

**NO<sub>x</sub>:** -275 lbs

**SO<sub>x</sub>:** 323 lbs

**CO:** 1923 lbs

**VOCs:** 1191 lbs

**PM<sub>10</sub>:** 190 lbs

## Fleet Conversion to Biodiesel (B20)

Using biodiesel instead of diesel is a simple and effective way to achieve large reductions in CO<sub>2</sub> emissions from vehicles. There is no need to convert the vehicles, so there is no capital cost to the switch. Biodiesel can be used by itself (called B100 for 100% biodiesel), or mixed with petroleum diesel. A popular mix is B20, 20% biodiesel with 80% petroleum diesel.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with area service stations to explore offering more widespread availability of biodiesel fuel to the public.

**Cost:** \$6,500 (\$1.00 per household)

**Payback:** 0 years

**Co-Benefits:**    

### Scope

6,500 households targeted

### Annual Reductions

**CO<sub>2</sub>e:** 1,100 tonnes

**Vehicle Miles:** 2,302,186 mi

**Gasoline:** 116,862 gal.

**\$:** \$233,724

**NO<sub>x</sub>:** 349 lbs

**SO<sub>x</sub>:** 23 lbs

**CO:** 79,001 lbs

**VOCs:** 8,285 lbs

**PM<sub>10</sub>:** 170 lbs

## Education on Low-carbon Transportation Options

Educational and marketing efforts can have a significant effect in getting people to choose other transportation modes besides driving, in many cases comparable to the effect of much more expensive system upgrades. Successful marketing efforts involve a two-way flow of information, finding out what people want in transit and what information will help them use it.

Individualized marketing has been particularly successful, surveying people to find out their interest in automobile alternatives, then sending targeted information they request about what is available in their particular location.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should promote a variety of transportation options (transit, ridesharing, walking, bicycling) which are more effective than just providing information on a single mode. A multi-modal access guide can help people find a car-free way from starting point to destination.

# Community Transportation Measures

## Electric Vehicles

Electric vehicles (EVs) run off of electricity and battery power as opposed to more traditional fuels types like gasoline and diesel fuel. EVs also use regenerative braking to capture and reuse the energy of the vehicles' momentum. They will have a major impact on our fuel reduction, and, when paired with renewable energy sources, will also greatly reduce GHG emissions.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should explore community interest in and the feasibility of EV usage in our town, particularly the use of plug-in stations for commuter parking lots and other traveled areas.

**Cost:** \$1,000,000 (\$10,000 additional cost of each vehicle)

**Payback:** 35.1 years

**Co-Benefits:**    

### Scope

100 electric vehicles

### Annual Reductions

**CO<sub>2</sub>e:** 169 tonnes

**Gasoline:** 32,000 gal.

**Energy:** - 355,200 kWh

**\$:** \$28,480

**NO<sub>x</sub>:** - 258 lbs

**SO<sub>x</sub>:** -1,484 lbs

**CO:** 21,263 lbs

**VOCs:** 2,227 lbs

**PM<sub>10</sub>:** -280 lbs

## Electric Vehicle Charging Stations in Parking Structures and Other Locations

Electric vehicle (EVs) drive trains are much more efficient than the drive trains used on standard internal combustion engine vehicles. Electric motors, rather than pistons and shafts, provide necessary propulsion. EVs use regenerative braking to capture and reuse the energy of the vehicle's momentum in stop-and-go traffic, greatly increasing their efficiency in city driving. The availability of EV charging stations promotes the idea of switching to EVs. EV charging stations must be present before consumers purchase EVs.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should consider the feasibility of providing charging stations in strategic locations in the community, including parking spaces that are reserved for EVs and have a charging connection.

**Cost:** \$200,000 (Approx. \$4,000 per station)

**Payback:** Not available

**Co-Benefits:**    

### Scope

50 Charging Stations

### Annual Reductions

**CO<sub>2</sub>e:** 50 tonnes

**Gasoline:** 9,408 gallons

**Energy:** - 104,429 kWh

**\$:** \$8,373

**NO<sub>x</sub>:** -76 lbs

**SO<sub>x</sub>:** -436 lbs

**CO:** 6,251 lbs

**VOCs:** 655 lbs

**PM<sub>10</sub>:** -82 lbs

**Cost:** \$384,000 (\$3,000 additional cost of CNG Vehicle)

**Payback:** 8.5 years

**Co-Benefits:**    

### Scope

128 vehicles

### Annual Reductions

**CO<sub>2</sub>e:** 184 tonnes

**Gasoline:** 78,242 gal.

**\$:** \$44,989

**NOx:** 113 lbs

**SOx:** 11 lbs

**CO:** 43,669 lbs

**VOCs:** 5,340 lbs

**PM10:** 94 lbs

## Compressed Natural Gas (CNG) Vehicles

Natural gas is a clean-burning alternative to gasoline or diesel for municipal and private fleet vehicles. While natural gas is a fossil fuel, it has lower carbon emissions per unit of energy than gasoline or diesel.

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should explore bringing the necessary infrastructure (pumping stations) to the community and promote the merits of CNG vehicles.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

### Scope

4,886 employees offered carpool and vanpool incentives

### Annual Reductions

**CO<sub>2</sub>e:** 2,241 tonnes

**Vehicle Miles:** 4,690,560 mi

**Gasoline:** 238,099 gallons

**\$:** \$476,199

**NOx:** 711 lbs

**SOx:** 46 lbs

**CO:** 160,960 lbs

**VOCs:** 16,880 lbs

**PM10:** 346 lbs

## Promote Use of Public Transportation, Carpooling and Vanpooling

Using public transportation or sharing a car or van to get to work is much more efficient than driving to work alone. Less fuel is used per passenger and vehicle costs are spread over more than one person.

Metropool's NuRide program, available in Westchester County, is a free on-line ridesharing match, in which members are rewarded for carpooling and vanpooling. For more information, visit [www.nuride.com](http://www.nuride.com)

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should consider education programs to inform the community about the cost savings, health benefits, and possible savings associated with the use of public transportation, carpooling and vanpooling.

# Community Transportation Measures

## Initiate a Carshare

Carsharing provides an alternative by allowing access to a car when needed, at a per-mile or hourly charge. For people who use a car infrequently, a carshare program is much less expensive than car ownership. People who participate in a carshare program drive 30-60% less than people who own cars.

Carsharing encourages a reduction in vehicle miles by shifting the fixed costs of car ownership to costs people think about each time they make a choice between driving and another transportation mode.

Zipcar is an example of a successful private company working with communities to reduce VMT. Zipcar has 180,000 members in many US and some European cities. It reports member driving reductions from 5295 miles/year before joining to 369 miles/year after.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should explore community interest in and the feasibility of a carshare program for Bedford.

**Cost:** \$1.10 Costshare per mile

**Payback:** Not available

**Co-Benefits:**    

### Scope

200 carshare participants

### Annual Reductions

**CO<sub>2</sub>e:** 172 tonnes

**Vehicle Miles:** 360,000 mi

**Gasoline:** 18,274 gal.

**\$:** \$36,548 (+ \$636,000 avoided cost of car ownership)

**NOx:** 55 lbs

**SOx:** 4 lbs

**CO:** 12,354 lbs

**VOCs:** 1,296 lbs

**PM10:** 27 lbs

## Increase Rail Transit Ridership

Bedford is currently close to capacity on parking permits. To increase ridership by Bedford residents and neighboring towns to NYC or other stations in the County, the town should explore the option of additional parking. A thorough cost analysis should be completed along with engaging the partnership of the MTA in this long-term project.

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should also look for ways to increase rail ridership by: exploring the feasibility of a jitney service that will pick riders up at convenient locations and take them to the area train stations, researching successful local models (such as the Housatonic Area Regional Transit (HART) shuttle that transports Ridgefield, CT residents to the Katonah train station), and exploring interest levels among residents for this type of service by conducting surveys.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

### Scope

100 additional daily transit passengers

### Annual Reductions

**CO<sub>2</sub>e:** 132 tonnes

**Vehicle Miles:** 357,700 mi

**Gasoline:** 18,157 gal

**Energy:** - 108,127 kWh

**\$:** \$36,314

**NOx:** -53 lbs

**SOx:** -450 lbs

**CO:** 12,162 lbs

**VOCs:** 1,275 lbs

**PM10:** -73 lbs

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

### Scope

796 additional daily bus passengers

### Annual Reductions

**CO<sub>2</sub>e:** 181 tonnes

**Vehicle Miles:** 1,162,160

**Gasoline:** 58,993 gal

**Diesel:** -39,318 gal

**NO<sub>x</sub>:** -1232 lbs

**SO<sub>x</sub>:** -183 lbs

**CO:** 38,087 lbs

**VOCs:** 3603 lbs

**PM<sub>10</sub>:** - 107 lbs

## Increase School Bus Ridership

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with Bedford Central and Katonah–Lewisboro School Districts to increase student use of buses or car-pooling by launching an education campaign on the cost and health benefits to parents, their families, and the community.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

### Scope

608 additional daily passengers riding the bus / avoided car trips to station

### Annual Reductions

**CO<sub>2</sub>e:** 69 tonnes

**Gasoline:** 22,530 gallons

**Diesel:** - 15,016 gallons

**\$:** \$65,111 or \$107 per student (at \$2.89/gal)

**NO<sub>x</sub>:** -471 lbs

**SO<sub>x</sub>:** -70 lbs

**CO:** 14,546 lbs

**VOCs:** 1,376 lbs

**PM<sub>10</sub>:** -41 lbs

## Increase Bus Ridership + Regional Transportation Study to Determine Commuting Patterns

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should initiate a study to determine commuting patterns as well as community interest in and the feasibility of a commuter bus system linking the hamlets to Park and Rides and the Metro North train stations in our area. This study would also require a survey to all households in the town to best determine probable use and interest.

# Community Transportation Measures

## Enforce Westchester County's Anti-Idling Law for Trucks

On February 10, 2009, Westchester County adopted the Anti Idling Law to limit idling, when a vehicle is not in motion, to three consecutive minutes. This law applies to all non emergency vehicles, including school buses on school property and venders doing business in the County of Westchester. Idling a diesel vehicle for one hour a day is equivalent in engine wear to driving 64,000 miles and using over 500 gallons of fuel annually. Gasoline wasted while idling is the equivalent of 22 lbs of eCO<sub>2</sub> for every hour of idling.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work together to enforce Westchester County's anti-idling law for all commercial trucks doing business in the town. The town should consider tracking tickets issued and prohibit excessive offenders from doing business in the town.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

### Scope

233 vehicles

### Annual Reductions

**CO<sub>2</sub>e:** 266 tonnes

**Diesel:** 27,960 gallons

**\$:** \$69,900

**NO<sub>x</sub>:** 1,001 lbs

**SO<sub>x</sub>:** 138 lbs

**CO:** 1,276 lbs

**VOCs:** 412 lbs

**PM<sub>10</sub>:** 137 lbs

## Enforce Westchester County's Anti-Idling Law for all Non-Emergency Cars

On February 10, 2009, Westchester County adopted the Anti Idling Law to limit idling, when a vehicle is not in motion, to three consecutive minutes. This applies to all vehicles with the exception of emergency vehicles and several other external conditions, including temperatures below 32 degrees F.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work to enforce Westchester County's anti-idling law by creating and distributing information to the residents of town.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

### Scope

145 buses

### Annual Reductions

**CO<sub>2</sub>e:** 127 tonnes

**Diesel:** 13,340 gal

**\$:** \$33,350

**NO<sub>x</sub>:** 478 lbs

**SO<sub>x</sub>:** 66 lbs

**CO:** 609 lbs

**VOCs:** 196 lbs

**PM<sub>10</sub>:** 65 lbs

## Enforce Westchester County's Anti-Idling Law for Local Transit Buses and School Buses

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should partner with Westchester County, the BeeLine system and the Bedford Central and Katonah Lewisboro school districts to launch an education campaign on the public health risks of idling. The campaign could support town-wide written material as well as anti-idling signs placed in common idling areas.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

### Scope

16,800 weekly trips switching from car to bicycle

### Annual Reductions

**CO<sub>2</sub>e:** 835 tonnes

**Vehicle Miles:** 1,747,200 mi

**Gasoline:** 88,690 gal.

**\$:** \$177,381

**NO<sub>x</sub>:** 265 lbs

**SO<sub>x</sub>:** 17 lbs

**CO:** 59,957 lbs

**VOCs:** 6,288 lbs

**PM<sub>10</sub>:** 129 lbs

## Increase Bike and Pedestrian Infrastructure, Create Bicycle Friendly Zones

Dedicated bike paths and bicycle lanes on roadways reduce the danger motor vehicles pose to bicyclists. They also make bicycling faster and more pleasant. Well-maintained surfaces, good lighting, a feeling of security, and strategic locations constitute the elements of a good bicycle route network. Adding crossing signals specifically for bicycles at major roads also helps to ensure efficient flow on the bike path network as well as providing greater safety for bicyclists at dangerous road interfaces.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work to address the issues relating to bike and pedestrian use such as widening the shoulder of important commuting roads, fostering greater coordination with the Bicycle Advisory committee for additional projects and expansion ideas, tying new development permits to creating bike paths linked to adjacent public and private ways, and encouraging area stores to create a bicycle incentive program. (This will also encourage local shopping).

# Community Transportation Measures

## Integrate Bicycles and Transit

Bicycles are the most efficient mode of transportation. They produce no air pollution and place minimal burdens on natural resources. Bicycles are especially appropriate in reducing the number of short trips—up to five miles or so—which constitute more than half of all driving. But bicycles can also serve longer trips, on their own or in combination with bus and rail. Combining bicycles with transit can extend the use of both, allowing transit to be used when the destination is too far from a transit stop for walking. A survey found that 30% of users of bike lockers at a transit station in Vancouver, BC had not used transit before the lockers were installed.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with Metro North Transit systems to provide bike lockers, shelters or other secure facilities at stations and stops, to design stations with bike ramps and other amenities, and to educate the community about the benefits of bicycle use.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

### Scope

2400 additional daily bike/transit trips replacing cars

### Annual Reductions

**CO<sub>2</sub>e:** 4,036 tonnes

**Vehicle Miles:** 10,512,000 mi

**Gasoline:** 533,604 gal.

**\$:** \$1,087,208 annual savings @ \$2 a gallon

**NO<sub>x</sub>:** -1041 lbs

**SO<sub>x</sub>:** -11,007 lbs

**CO:** 357,969 lbs

**VOCs:** 37,521 lbs

**PM<sub>10</sub>:** -1657 lbs

## Create Pedestrian Friendly Zones and Increase Hamlet Sidewalks

Walking brings health and environmental benefits, reduces traffic congestion, and brings customers to business along the walking routes. Planning that prioritizes pedestrian needs will require a different design from that which prioritizes vehicles. People are more likely to walk in interesting and safe environments. This implies things like attractive sidewalks, barriers between pedestrians and traffic, slowing down traffic, etc.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with Bedford's merchants to encourage pedestrian traffic by creating walkways and pedestrian-friendly outdoor areas linked to adjacent public and private ways.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

### Scope

500 weekly trips switching from car to walking

### Annual Reductions

**CO<sub>2</sub>e:** 6 tonnes

**Vehicle Miles:** 13,000 mi

**Gasoline:** 660 gal.

**\$:** \$1,320

**NO<sub>x</sub>:** 2 lbs

**SO<sub>x</sub>:** 0 lbs

**CO:** 446 lbs

**VOCs:** 47 lbs

**PM<sub>10</sub>:** 1 lbs



**Cost:** \$18,250

**Payback:** 2.2 years

**Co-Benefits:**    

**Scope**

73 bicycles available

**Annual Reductions**

**CO<sub>2</sub>e:** 38 tonnes

**Vehicle Miles:** 79,935 mi

**Gasoline:** 4,058 gal

**\$:** \$8,115

**NOx:** 12 lbs

**SOx:** 1 lb

**CO:** 2,743 lbs

**VOCs:** 288 lbs

**PM10:** 6 lbs

**Provide Bicycles for Daily Trips**

Many U.S. cities have adopted a bicycle-sharing program with easy docking stations around town. Some programs take repaired donated bikes and simply place them on the sidewalk for use, usually painted a particular color for identification. Other programs have bike stands at transit stations and areas with high pedestrian traffic, where bikes are unlocked with a coin deposit or magnetic card. The deposit is returned when the bike is brought to any station.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should explore the feasibility of such a bike sharing program as well as a partnership with a private organization that already runs economically successful programs in similar towns.

**Cost:** \$0

**Payback:** 0 years

**Co-Benefits:**    

**Scope**

200 students walking or biking  
each day to school

**Annual Reductions**

**CO<sub>2</sub>e:** 55 tonnes

**Vehicle Miles:** 115,200 mi

**Gasoline:** 5,848 gal

**\$:** \$17,543

**NOx:** 17 lbs

**SOx:** 1 lb

**CO:** 3,953 lbs

**VOCs:** 415 lbs

**PM10:** 9 lbs

**Safe Routes to School**

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with local community schools to: explore opportunities to create safe walking routes to school, launch an education campaign on the health benefits for children who walk to school, expand the pedestrian friendly zones and sidewalks where the Safe Routes to School program is used, and promote special “Walk to School” days.

# Community Transportation Measures

## Retrofit School Buses with Oxidation Catalysts

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with Katonah-Lewisboro and Bedford Central School Districts to retrofit school buses with oxidation catalysts and emission controls. This would promote measurable GHG emission reductions and significantly improve the air quality around the school bus areas where children congregate to board or depart the buses.

**Cost:** \$145,000 (\$1,000 per bus, assumes 85% - 90% paid by available funding)

**Payback:** Not available

**Co-Benefits:**



### Scope

145 School Buses

### Annual Reductions

**CO:** 11,315 lbs

**VOCs:** 3,652 lbs

**PM10:** 405 lbs

## School Bus Emissions Controls – Particulate Trap

Diesel particulates are carcinogenic and may contribute to asthma. Because school buses operate in close proximity to children, whose lungs are the most vulnerable, it is important to control emissions from them. Particulate filters remove soot and unhealthy matter from the air.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with the Katonah-Lewisboro and Bedford Central School Districts to explore the feasibility of adding particulate filters to all district school buses.

**Cost:** \$145,000 (\$1,000 per bus, assumes 85% - 90% paid by available funding)

**Payback:** Not available

**Co-Benefits:**



### Scope

145 Buses

### Annual Reductions

**NOx:** 247 lbs

**CO:** 11,315 lbs

**VOCs:** 3,652 lbs

**PM10:** 1,216 lbs

# d. Waste + Recycling

(20.9% of total proposed GHG reductions)



Greenhouse gas emissions from the waste sector come from both direct and indirect sources. Direct emissions can be easily attributed to the breakdown of waste buried in landfills, producing methane, while indirect emissions are a result of the energy needed to produce the materials we consume.

There is currently no organized town wide trash collection in the Town of Bedford. Bedford residents contract directly with the carter of their choice and each picks up and hauls waste to various landfills or other disposal centers. The haulers have no reporting requirements to the town, making accurate data collection difficult.

According to our Emissions Inventory, the Waste Sector contributes 5% of The Town of Bedford's annual greenhouse gas emissions. In gathering data for Bedford, we considered only waste that was generated within our town borders. Direct emissions are not reflected because Bedford does not have a landfill. However, the consumption habits and disposal methods of the residents of Bedford are contributing to greenhouse gas emissions that would be counted in the inventory of the city in which the landfill is located.

While we may not measure a high percentage of emissions from the Waste Sector in our town, we have a responsibility to examine our existing waste generation and disposal and reduce emissions wherever they are measured.

The actions outlined in this section focus on reducing emissions through reducing waste and increasing recycling and composting in both homes and businesses.

total GHG reduction in sector: **40,591 Tonnes CO<sub>2</sub>e**

co-benefits:    

# Municipal Waste + Recycling Measures

## Zero Waste Goal for Public Events

Zero Waste is a strategy that considers the life cycle of all products (where did they come from and where do they end up after we are done with them). This strategy reduces cost, promotes health, and encourages efficiency (waste is essentially inefficiency.)

The Town of Bedford should create a zero waste goal for all Town sanctioned public events. This means that non biodegradable or recyclable plastics should not be purchased and that all food and all waste should be, compostable recyclable or reusable. This will divert our waste from the landfill thereby reducing the global green house gasses associated with the manufacturing and transportation of products and the production of methane from the landfill.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**   

## Municipal Green Procurement and Recycling Policy

The purchasing decisions that we make and the disposal methods we choose have a profound impact on the environment.

The Town of Bedford should develop a Municipal Green Policy that requires environmental considerations into every aspect of acquisition. All items should be vetted through a sustainability lens before purchase to examine the life cycle of a each product (where it was made, where does it go after its usefulness). This would enable the town to reduce the use of products that are created with high energy content or no recycling potential, and would decrease the overall Ecological Footprint, as well as save money. The town should also consider a policy that requires the recycling of paper, cardboard, ink & toner cartridges, and e-waste in all municipal offices, buildings and recreational facilities.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**   




## Composting Bins at Town Parks

The Town of Bedford should designate town property in town parks and recreational areas for the use of composting bins to be used to collect municipal organic waste such as leaves and yard waste. Not only would the Town be leading by example, but the location of composting bins in public areas would assist in the goal of educating the entire community about the benefits of composting. Proper signage at such areas could serve as an effective way of instructing the public about the benefits of composting. The Town should also explore the feasibility of including municipal food waste in these composting areas.

**Cost:** Not available




**Payback:** Not available

**Co-Benefits:**   

**Cost:** Not available  
**Payback:** Not available  
**Co-Benefits:**   

## Expand and Enhance Existing Municipal Composting


The Town of Bedford has a composting area on Beaver Dam Road for composting yard waste. The facility is currently utilized for town collected leaves and tree waste and is not open to residents. The town should re-evaluate its own municipal composting facility to explore how it might be used as a revenue generator, as an educational tool for composting and as a source of compost for the community.

**Cost:** Not available  
**Payback:** Not available  
**Co-Benefits:**   

## Reuse/Recycling of Construction Materials

In the event of a remodel, or tear down, most materials are demolished and sent to the landfill. The wood, hardware, windows, kitchens cabinets, sinks that are traditionally discarded could be reused. There are many reclaim and reuse (deconstruction) companies that will take what would typically be discarded and find another use elsewhere. The energy benefit for Bedford in reusing products would be in diverting the GHG from the mining and transportation of raw materials to factories and wastes created from the generation and transportation of new products as well as reducing emissions from the landfill.

The Town of Bedford should consider a policy in which all town construction or renovation projects be regulated to require recycling of construction debris.

**Cost:** Not available  
**Payback:** Not available  
**Co-Benefits:** 

### Scope

All municipal buildings

### Annual Reductions

**VOCs:** 100 lbs

## Low-VOC Procurement Policy for Cleaning Products and Paint

Many cleaning products release volatile organic compounds (VOC's) that are harmful to health in indoor environments, and contribute to regional air pollution. These VOC's contribute to ozone formations. Paints are a significant source of both indoor and outdoor air pollution. Oil-based and glossy paints and varnishes use VOCs as solvents, which evaporate into the air as the paint dries. Indoors, these VOCs can cause a variety of health problems, while outdoors they contribute to the formation of smog. Emissions can continue for up to six months after painting.

The Town of Bedford should require low or no VOC cleaning products in Town facilities to promote the health of the employees working in the environment and to reduce air pollution in the region.

# Community Waste + Recycling Measures

## Bedford Waste & Recycling Study

There is currently no organized town wide trash collection in the Town of Bedford. Bedford residents contract directly with the carter of their choice and each picks up and hauls to various landfills or other disposal centers. Under this current system, multiple carters may take the same route on the same day to collect residential and commercial waste, adding to our transportation emissions and creating basic inefficiencies. The haulers have no reporting requirements to the town, making accurate data collection difficult.

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should conduct a comprehensive study of waste and recycling in the Town of Bedford. Such a study should determine: the composition of our waste stream, the amount of waste generated, and the location and method of disposal. Best practices should be examined and evaluated to determine feasibility for Bedford, including: Pay As You Throw programs, Zero Waste programs, curbside collection of food waste and other compostable materials, deconstruction and reuse facilities, and the feasibility of an organic waste composting facility.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**   

## Develop Reporting Requirements for Carters




The Town should use its permitting process to create an efficient and environmentally responsible waste and recycling system. Under Bedford's current multiple carter system, haulers must be permitted to operate in the town, but they have no reporting requirements. Detailed information from carters can help make informed decisions about how to allocate resources and target education toward source reduction, recycling and composting, thereby creating an environmentally friendly and efficient waste and recycling system and becoming better stewards of the environment.

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should develop reporting requirements for carters that they agree to at the time of permitting. Haulers should be required to report quarterly on such data as: routes and number of pick ups, weight and composition of waste, and the procedures, means and methods of disposal.

**Cost:** \$0

**Payback:** 0 years

**Co-Benefits:**   

**Cost:** \$0  
**Payback:** 0 years  
**Co-Benefits:**   

### Scope

503 lbs per person/yr of waste diverted from landfills




### Annual Reductions

**CO<sub>2</sub>e:** 14,499 tonnes  
**Energy:** 20,728,970 kWh  
**NO<sub>x</sub>:** 62,042 lbs  
**SO<sub>x</sub>:** 27,549 lbs  
**CO:** 1,182 lbs  
**VOCs:** 62 lbs  
**PM10:** 166 lbs

## Establish/Expand Curbside Recycling Programs & Increase Plastic Recycling Eligibility

Curbside recycling is an efficient way for residents to recycle as much as 85% of their home garbage. This would reduce a significant amount of waste material going to the landfill and preventing additional GHG emissions.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with our town carters to require the collection of additional items, such as: junk mail, cardboard, bottles and cans and all plastics 1-7.

**Cost:** Not available  
**Payback:** Not available  
**Co-Benefits:**   

## Waste & Recycling Education Campaign

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should consider a series of educational programs to communicate with residents, businesses, schools, institutions, and civic and religious entities to address the myriad issues surrounding consumption, waste and recycling. The focus of such programs might include: consumption patterns; the purchase of goods that are durable, repairable and reusable; minimal packaging; recycling of office materials such as paper, ink cartridges, computers, etc

# Community Waste + Recycling Measures

## Implement Pay-as-You-Throw Program

According to the EPA, 85% of all waste is either recyclable or compostable. Pay-as-you-throw programs provide a financial incentive for people to reduce the amount of waste they generate. Pay-as-you-throw programs encourage recycling, reuse of items, and source reduction, where people may choose items with less packaging knowing they will have to pay for the disposal of that packaging. In addition, the program would encourage home composting of food and yard waste. This is a fair way to charge for garbage disposal services, as people pay in proportion to the amount of waste they generate. This program would decrease Bedford's indirect GHG emissions significantly. Potentially only 15% of residential waste would be carted to the landfill decreasing the methane produced in the landfill, thereby curtailing our global greenhouse emissions.

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should explore community interest in, and the feasibility of, a pay-as-you-throw program for Bedford.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**   

### Scope

300 lbs per person/yr of waste reduced

### Annual Reductions

**CO<sub>2</sub>e:** 8,263 tonnes

**Energy:** 11,912,999 kWh

**NOx:** 35,656 lbs

**SOx:** 15,832 lbs

**CO:** 679 lbs

**VOCs:** 36 lbs

**PM10:** 95 lbs

## Reuse Facilities/Programs

Reusing products instead of throwing them away eliminates the GHGs associated with the mining and transportation of raw materials and diverts unnecessary waste from landfills.

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should establish a local Reuse Facility to encourage the exchange of materials and products between residents and divert material from the waste stream.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**   

### Scope

100 lbs per person/yr of waste prevented

### Annual Reductions

**CO<sub>2</sub>e:** 6,652 tonnes

**Energy:** 11,531,520 kWh




**NOx:** 34,514 lbs

**SOx:** 15,325 lbs

**CO:** 657 lbs

**VOCs:** 35 lbs

**PM10:** 92 lbs

**Cost:** \$0  
**Payback:** 0 years  
**Co-Benefits:**   

### Scope




100 lbs per person/yr of waste diverted from landfill

### Annual Reductions

**CO<sub>2</sub>e:** 3,156 tonnes  
**Energy:** 4,599,832 kWh  
**NO<sub>x</sub>:** 13,767 lbs  
**SO<sub>x</sub>:** 6,113 lbs  
**CO:** 262 lbs  
**VOCs:** 14 lbs  
**PM<sub>10</sub>:** 37 lbs

## Establish/Expand Business Recycling Programs

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should explore a town regulation that requires carters to collect junk mail, cardboard, bottles and cans, metals and all plastics 1-7 from business and commercial entities in the town of Bedford. This would decrease our GHG emissions by diverting waste to the landfill, and encouraging a more conscientious business owner.

**Cost:** Not available  
**Payback:** Not available  
**Co-Benefits:**   

### Scope

804 lbs per person/yr of waste diverted from landfill

### Annual Reductions

**CO<sub>2</sub>e:** 4,052 tonnes

## Organics Composting Facility

When organic matter like wood, paper, food, and yard waste is placed in landfills it decomposes anaerobically producing methane. Methane is a greenhouse gas 21 times as powerful as carbon dioxide. About 12% of municipal solid waste is food scraps, and another 12% is yard waste. Collecting and composting organic waste prevents emissions that would have been produced in a landfill.

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should promote organics composting in order to capitalize on GHG reductions associated with diverting waste from the landfill. To this end, they should consider establishing a composting facility in the Town of Bedford or work with the Northern Westchester Energy Action Coalition (NWEAC) to identify a regional composting site for all of northern Westchester. Such a facility should be set up to permit residents to drop off organic waste materials and take home compost for use in towns and gardens. The town should also explore the feasibility of commercial and residential food-waste collection.

# Community Waste + Recycling Measures

## Home Composting Initiative

Organic matter like food, wood, and yard waste decomposes extremely slowly in a landfill and when it does decompose, it manufactures methane gas. Methane is a GHG 21 times more potent than carbon dioxide.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work to establish an expanded yard waste composting program and create community-wide education and demonstration projects to encourage home yard and food waste composting.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**   

### Scope

300 lbs per person/yr of waste diverted from landfill

### Annual Reductions

**CO<sub>2</sub>e:** 1,153 tonnes

## Reuse/Recycling of Construction Materials

In the event of a remodel, or tear down, most materials are demolished and sent to the landfill. The wood, hardware, windows, kitchens cabinets, sinks that are traditionally discarded could be reused. There are many reclaim and reuse (deconstruction) companies that will take what would typically be discarded and find another use elsewhere.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should develop best practices to educate contractors, builders and the town on the benefits of recycling and reusing materials. They should also explore possible mandates that would require the reuse and recycling of debris on all construction sites.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**   

## Zero Waste Goal for Public Events and Events on Public Land

Zero Waste is a strategy that considers the life cycle of all products (where did they come from and where do they end up after we are done with them). This strategy reduces cost, promotes health, and encourages efficiency (waste is, essentially, inefficiency).

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should create a goal for all public events to be zero waste. This means that non biodegradable or recyclable plastics should not be purchased and that all food and all waste should be, compostable recyclable or reusable. This will divert our waste from the landfill thereby reducing the global green house gasses associated with the manufacturing and transportation of products and the production of methane from the landfill.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**   

**Cost:** \$50,000 (\$100 per business)

**Payback:** < 1year

**Co-Benefits:**    

### Scope

500 participating businesses

### Annual Reductions

**CO<sub>2</sub>e:** 2,816 tonnes

**Energy:** 4,842,500 kWh,

180,500 therms

**\$:** \$690,020

**NO<sub>x</sub>:** 7,851 lbs

**SO<sub>x</sub>:** 20,440 lbs

**CO:** 5,828 lbs

**VOCs:** 733 lbs

**PM<sub>10</sub>:** 4,543 lbs

## Green Business Programs

Green business programs are voluntary programs to encourage businesses to go beyond operations regulations and to conduct business in an environmental friendly manner. Businesses receive a checklist of measures, and implement a certain number of them to be certified. The incentive for businesses to participate is good publicity resulting from their efforts, the ability to advertise as a certified green business and lower business costs. Green businesses can help reduce GHG in all sectors: energy consumption, transportation and waste.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with Bedford's business and commercial entities to discuss appropriate waste and recycling measures that would create a standard for a Bedford green business program.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**   

## Plastic & Paper Bag Fee / Reusable Bag Distribution

Neither paper or plastic bags are a good choice for the environment - both consume large amounts of natural resources in their production, significantly pollute our environment, and are ineffectively recycled. Plastic bags are petroleum based and consume twelve million barrels of oil in annual production. According to EPA data, between 500 billion and one trillion plastic bags are consumed worldwide each year, and of those, less than one percent are recycled. 100 billion are sent to landfills and the rest end up in our trees, lakes, rivers and oceans. Paper bags are no better. Americans consume more than ten billion paper bags per year and only 10 to 15 percent are recycled. Their production significantly contributes to the pollution of our air and water, and also destroys forests. About 14 million trees are cut down annually for paper bag production.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should explore one of two options: either an outright ban or a fee on both plastic bags and paper bags in stores that have greater than 5000 sq. feet of space. A fee would fund a reusable bag distribution to Bedford town residents though the implementation of such a fee would probably require a Home Rule Exemption from the State of New York. A ban would not. The Pace Environmental Law Clinic has offered to study both options for the Town and help recommend sound and legally defensible policy.

# Community Waste + Recycling Measures

## #6 Plastic Ban

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should consider a ban on all Polystyrene in products designed as disposable or single use in the Town of Bedford. This product material is not currently recyclable and has many toxins associated with it. There are many products to substitute for styrofoam and polystyrene that have life cycles that either are recyclable or are biodegradable at the end of their usefulness. This would reduce Bedford's overall global green house gas emissions and contribute to better health of its residents.

**Cost:** \$0

**Payback:** 0 years

**Co-Benefits:**   

## Tap Water Campaign

Plastic bottles are created with petroleum, and require more water to produce than the bottle ultimately holds. The water used in the production of water bottles is inefficient and wasteful and the production requires tremendous energy. Bottled water is not regulated. Bedford's Town water is closely monitored and most private well sources are clean, therefore there is no reason to buy bottled water. The eventual elimination of bottled water will significantly diminish the Town's greenhouse gas emissions.

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should launch a campaign to create a new culture of tap water drinkers with a goal of eliminating plastic water bottles.

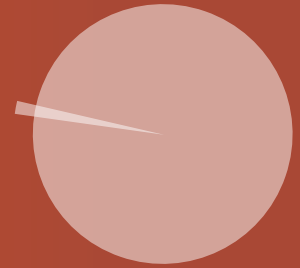
**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

# e. Land + Water Use

(1.2% of total proposed GHG reductions)



The Bedford Comprehensive Plan ([www.bedfordny.info](http://www.bedfordny.info)) and much of the work of Bedford's Conservation Board are focused on land use principles that provide a framework for future development, preservation and conservation of our community. Their areas of concern include open space and natural environment, residential development, business development, community services and facilities, transportation and community appearance and historic preservation.

The Measures contained within the Land Use sector of the Climate Action Plan address actions such as water conservation, transit oriented development and landscape alternatives, with specific metrics that will enable a calculation of GHG reductions when accomplished.

In addition, the Climate Action Plan focuses on the area of food and agriculture, specifically, the creation of a strong local food system that significantly increases the percentage of home grown and locally sourced food, accessibility to locally produced food, protection of farm land and the promotion and support of agricultural practices and initiatives in our community.

There is also a specific focus on trees as a natural means of curbing pollution, as a partial solution for storm water runoff, as shade providers, and as a significant element of native plant initiatives. The Climate Action Plan envisions a community wide effort to expand public and private programs to encourage the planting and preserving of trees on municipal, commercial and private land and to educate the public about the many environmental, commercial and social benefits of trees.

total GHG reduction in sector: **2,313 Tonnes CO<sub>2</sub>e**

co-benefits:    

# Municipal Land + Water Use Measures

## Water Conservation (3 Measures)

The Town of Bedford should evaluate and look to improve water conservation measures in its buildings and operations. These measures may include: use of gray water, low flow fixtures, modifying water use behaviors, using native plants, xeriscaping (landscape with little need for water) and rain collection techniques.

**Total Cost:** \$22,817

**Co-Benefits:**   

### Total Annual Reductions

**CO<sub>2</sub>e:** 2 tonnes

**Energy (annually):** 287,210 kWh

**Water (annually):** 13,450 gal.

**\$:** \$1,433

**NOx:** 5 lbs

**SOx:** 8 lbs

**CO:** 3 lbs

**VOCs:** 0 lbs

**PM10:** 1 lbs

### 1. Water Saving Shower Heads

Federal regulations require showerheads to have a flow rate of less than 2.5 gallons per minute (gpm), but prior to 1992, some showerheads had flow rates of 5.5 gpm. Using low flow shower heads will save significant amounts of energy and water resources.

The Town of Bedford should replace older shower heads in all town owned buildings.

**Cost:** \$145 (\$29 per showerhead)

**Payback:** < 1 year

### Scope

5 Showerheads replaced

### Annual Reductions

**CO<sub>2</sub>e:** 1 tonne

**Energy:** 252 kWh

83 e/ therms

**Water:** 13,450 gallons

**\$:** \$170

### 2. High Efficiency Toilets

Toilet flushing can account for one third of water use in commercial and office buildings. New High Efficiency Toilets with the WaterSense label use 1.3 gallons per flush or less, compared to the current federal standard of 1.6 gallons per flush. Old toilets may use 3.5 or 5 gallons or more per flush. High Efficiency Urinals use 0.5 gallons per flush or less compared to the current federal standard of 1.0 gallons per flush. Old urinals may use 2-3 gallons or more per flush.

The Town of Bedford should consider replacing older toilets and urinals with more efficient models in all town owned facilities.

**Cost:** \$22,400 (\$448 per toilet)

**Payback:** 19.5 years

### Scope

50 toilets replaced

### Annual Reductions

**CO<sub>2</sub>e:** 1 tonne

**Energy:** 1,549 kWh

**Water:** 286,786 gallons

**\$:** \$1,147

### 3. Water Saving Faucets

**Cost:** \$272 (\$8 per faucet)

**Payback:** 2.2 years

#### Scope

34 faucets replaced

#### Annual Reductions

**CO<sub>2</sub>e:** 0 tonnes

**Energy:** 172 kWh

57 e/therms

**Water:** 9,180 gallons

**\$:** \$116

The aerator—the screw-on tip of the faucet—ultimately determines the maximum flow rate of a faucet. Typically, new kitchen faucets come equipped with aerators that restrict flow rates to 2.2 gpm, while new bathroom faucets have ones that restrict flow rates from 1.5 to 0.5 gpm.

Aerators are inexpensive to replace and they can be one of the most cost-effective water conservation measures. For maximum water efficiency, purchase aerators that have flow rates of no more than 1.0 gpm. Some aerators even come with shut-off valves that allow you to stop the flow of water without affecting the temperature. When replacing an aerator, bring the one you're replacing to the store with you to ensure a proper fit.

The Town of Bedford should examine all faucets within the town buildings and replace older aerators with ones that allow no more than 1gpm flow.

**Cost:** \$4,480 (\$224 per tree)

**Payback:** 11 years

**Co-Benefits:** 

#### Scope

20 trees planted

#### Annual Reductions

**CO<sub>2</sub>e:** 2 tonnes

**Energy:** 4,080 kWh

**\$:** \$408

**NOx:** 4 lbs

**SOx:** 17 lbs

**CO:** 4 lbs

**VOCs:** 0 lbs

**PM10:** 4 lbs

### Plant Trees to Shade Buildings

This measure considers the effect trees can have in reducing energy required to heat and cool buildings. Trees properly planted with energy savings in mind can reduce the amount of energy (electricity, natural gas, or other fuel) used to cool and heat buildings. This not only reduces associated emissions, but also saves money. The shade from a single well-placed mature tree reduces annual air conditioning use two to eight percent (in the range of 40-300 kWh), and peak cooling demand two to ten percent (as much as 0.15-0.5 kW).

The Town of Bedford should work with the Tree Advisory Board and local garden clubs to develop best practices to encourage tree planting for shading town owned buildings.

# Municipal Land + Water Use Measures

## Low-Maintenance Landscaping

Well-groomed green lawns are aesthetically pleasing, but they come with a number of environmental costs. Landscaping using local native plants can greatly reduce or eliminate the need for irrigation, pesticides, herbicides, fertilizers, and gasoline powered maintenance equipment.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with local garden clubs and other experts to develop best practices for Town administrators to encourage low maintenance landscaping in our town owned lands.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**   

### Scope

21 Acres of low maintenance landscaping

### Annual Reductions

**CO<sub>2</sub>e:** 2 tonnes

**Energy:** 0 kWh

**Gasoline:** 168 gallons

**NOx:** 1 lbs

**SOx:** 0 lbs

**CO:** 114 lbs

**VOCs:** 813 lbs

**PM<sub>10</sub>:** 0 lbs

## Non-Asphalt Pavements

Paving alternatives can reduce the urban heat island effect, reducing energy use for cooling. Asphalt is made with petroleum products and can release large amounts of volatile organic compounds (VOCs), a primary component of smog, into the air while curing. In the Chicago metropolitan area, for example, asphalt paving emitted 13 tons of VOCs into the air each day during the summer peak smog season. One option for reducing emissions is to use asphalt with reduced VOC content. Many areas already prohibit the use of the high-VOC cutback asphalt, which uses petroleum-based thinner, during times when smog is a problem.

The Town of Bedford should work with local resources to develop best practices for encouraging the use of Non-Asphalt Pavements on our town roads and parking lots.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**   

# Community Land + Water Use Measures

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**    

## Scope

100 residential units in Transit Oriented Development

## Annual Reductions

**CO<sub>2</sub>e:** 588 tonnes

**Vehicle Miles:** 1,230,660 mi

**\$:** \$124,940

**Gas Saved:** 62,470 gal

**NOx:** 187 lbs

**SOx:** 12 lbs

**CO:** 42,231 lbs

**VOCs:** 4,429 lbs

**PM10:** 91 lbs

## Transit Oriented Development

High density neighborhoods with good rail or bus transit, mixed residential and commercial uses, and pedestrian-friendly development have much lower rates of car use than typical low-density suburban developments. Transit oriented design (TOD) attempts to create such neighborhoods in planning of new or existing transit systems.

While recognizing that the transit oriented development possibilities in Bedford are very limited, The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should identify opportunities that direct growth to within walking distance of mass transit – in the case of Bedford, to the Metro North train stations located in Katonah and Bedford Hills. TOD can also be developed around county bus lines, park-and-ride facilities and bike and pedestrian infrastructure located near the train that will encourage people to walk or bike to transit rather than driving. This may be a more viable option given the limited development conditions in the town.

**Cost:** \$0

**Payback:** 0 years

**Co-Benefits:**   

## Build Storm Water Capacity through Municipal Codes and Regulations

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should explore the enhancement of municipal codes and regulations that conserve water, including: review building storm water retention requirements and vegetation requirements, and revising codes to encourage organic land management practices.

**Cost:** \$0

**Payback:** 0 years

**Co-Benefits:**   

## Modified Town Water Billing System

While the majority of Bedford residents rely on private wells for their water, four water districts within the Town serve 2,720 households through public water supply systems. Water bills are rendered quarterly and fees are based on meter reading.

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should examining the existing rate structure and implement a more detailed sliding fee for water usage so that fees per unit of increased consumption increase with the amount of water consumed.

# Community Land + Water Use Measures

## Water Conservation (5 Measures)

The Town of Bedford, working with the Bedford 2020 Coalition and its partners, should evaluate and promote various water conservation measures among the residents and the landscaping industry. These measures may include: use of gray water, low flow fixtures, modifying water use behaviors, using native plants, xeriscaping (landscape with little need for water) and rain collection techniques.

**Total Cost:** \$2,283,226

**Co-Benefits:**   

### Total Annual Reductions

**CO<sub>2</sub>e:** 1,229 tonnes

**Energy:** 1,229,354 kWh

**Water:** 74,347,500 gal.

**\$:** \$418,241

**NOx:** 3,533 lbs

**SOx:** 5,250 lbs

**CO:** 1877 lbs

**VOCs:** 272 lbs

**PM<sub>10</sub>:** 1201 lbs

### 1. Water Saving Shower Heads

Federal regulations require showerheads to have a flow rate of less than 2.5 gallons per minute (gpm), but prior to 1992, some showerheads had flow rates of 5.5 gpm. Using low flow shower heads save significant amounts of energy and water resources. Therefore, if you have fixtures that pre-date 1992, you might want to replace them and save money on energy used for less pumping or if you belong to the Water District, save on billing costs. You can purchase some quality, low-flow fixtures for around \$10 to \$20 a piece and achieve water savings of 25%–60%

**Total Cost:** \$183,802 (\$29 per showerhead)

**Payback:** < 1 year

### Scope

6,638 showerheads replaced

### Annual Reductions

**CO<sub>2</sub>e:** 756 tonnes

**Energy:** 500,153 kWh  
101,670 e/therms

**Water:** 17,856,220 gallons

**\$:** \$233,058

### 2. Efficient Clothes Washers

Clothes washers are the second biggest water user in most homes (after toilets). High efficiency washers save water, energy, and detergent. Energy savings derive from reduced use of hot water and reduced water pumping costs. Efficient washers are also gentler on clothes, increasing their durability.

**Total Cost:** \$78,000 (\$150 incremental cost)

**Payback:** 11 years

### Scope

5,200 clothes washers replaced

### Annual Reductions

**CO<sub>2</sub>e:** 284 tonnes

**Energy:** 536,733 kWh

**Water:** 36,176,400 gallons

**\$:** \$70,787

**Total Cost:** \$108,464 (\$8 per faucet)

**Payback:** 2.1 years

### Scope

13,558 faucets replaced

### Annual Reductions

**CO<sub>2</sub>e:** 155 tonnes

**Energy:** 102,535 kWh

20,843 e/therms

**Water:** 3,660,660 gallons

**\$:** \$47,779

## 3. Water Saving Faucets

The aerator—the screw-on tip of the faucet—ultimately determines the maximum flow rate of a faucet. Typically, new kitchen faucets come equipped with aerators that restrict flow rates to 2.2 gpm, while new bathroom faucets have ones that restrict flow rates from 1.5 to 0.5 gpm.

Aerators are inexpensive to replace and they can be one of the most cost-effective water conservation measures. For maximum water efficiency, purchase aerators that have flow rates of no more than 1.0 gpm. Some aerators even come with shut-off valves that allow you to stop the flow of water without affecting the temperature. When replacing an aerator, bring the one you're replacing to the store with you to ensure a proper fit.

**Total Cost:** \$1,912,960 (\$448 per toilet)

**Payback:** 28.7 years

### Scope

4,270 toilets replaced

### Annual Reductions

**CO<sub>2</sub>e:** 34 tonnes

**Energy:** 89,933 kWh

**Water:** 16,654,220 gallons

**\$:** \$66,617

## 4. High Efficiency Toilets

Toilet flushing can account for one third of water use in commercial and office building and usually a top user in the home. New High Efficiency Toilets with the WaterSense label use 1.3 gallons per flush or less, compared to the current federal standard of 1.6 gallons per flush. Old toilets may use 3.5 or 5 gallons or more per flush. High Efficiency Urinals use 0.5 gallons per flush or less compared to the current federal standard of 1.0 gallons per flush. Old urinals may use 2-3 gallons or more per flush ensure a proper fit.

## 5. Promote Education, Information and Training on Water Conservation and Re-Use Systems

The Bedford 2020 Coalition should provide education, information and training on various water conservation and re-use methods, through a series of workshops targeted at residents and landscapers. Topics will include: use of rain water collection systems such as Rain Barrels, use of drought resistant grasses and native plantings, rain gardens, green roofs and organic landscape maintenance.

# Community Land + Water Use Measures

## Increase Supply, Availability, and Consumption of Local Food

Food and agriculture are central to the vitality of the Bedford community. Over 10% of US carbon emissions result from the food system – it may be closer to 30% if one includes food importation, agricultural related deforestation and soil degradation.

Individuals can reduce the impact of food choices on climate change by choosing locally produced and “low carbon” foods. By choosing to eat locally, individuals can reduce greenhouse gas emissions generated by food transportation, bolster the town’s economy and help preserve agricultural land in the Bedford area. By eating locally produced fresh food and by choosing grains, fruits and vegetables instead of meat, individuals also create a healthy diet.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work together to create in Bedford a strong local food system that significantly increases the percentage of home grown and locally sourced food. In particular, the group should work to educate the community on the skills needed to expand the growing of fruit and vegetables in home gardens or in cooperation with neighbors. In addition, the group should work to facilitate the creation of both community and school gardens. The group should also explore other ways to increase community access to locally produced food, including expanded farmers’ markets, support of local community supported agriculture farms, support of local businesses providing access to local food and legislative initiatives to protect agricultural land and promote farming. They might also consider how to bring more locally grown food to community outreach and feeding programs as well as community institutions such as hospitals.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**   

## Plant and Preserve Trees

Trees remove CO<sub>2</sub> from the atmosphere, use the carbon to form the physical structure of the tree (roots, trunk, branches and leaves), and return the oxygen to the atmosphere. A single mature tree can absorb as much as 48 lbs of CO<sub>2</sub> per year. Trees are also natural pollution-control devices. They absorb carbon dioxide and return oxygen to the air. Their leaves, branches, and trunks help slow the runoff of storm water. They also provide sound buffering, shade, and measurably cooler temperatures on hot summer days, and breeding and roosting places for local and migratory birds, whose habitat has been disappearing. Trees also have the potential to increase business in commercial areas through beautification.

The Bedford 2020 Coalition should work with the Town, local garden clubs and other partners to expand public and private programs to encourage the planting and preserving of trees on municipal, commercial and private land with an emphasis on native species that are appropriate in size and form to each location. Threats to existing trees, such as invasive vines and the winter salting of area roads, should be closely examined and remedied. The group should also develop and implement an outreach campaign to educate the public about the many environmental, commercial and social benefits of trees. They should also focus on educating the community about existing tree regulations and tree maintenance and care.

**Cost:** \$112,000 (\$224 per tree)

**Payback:** 320 years

**Co-Benefits:**   

### Scope

500 trees

### Annual Reductions

**CO<sub>2</sub>e:** 126 tonnes

**Energy:** 3,500 kWh

**\$:** \$350

**NO<sub>x</sub>:** 3 lbs

**SO<sub>x</sub>:** 15 lbs

**CO:** 4 lbs

**VOCs:** 3 lbs

**PM<sub>10</sub>:** 0 lbs

## Plant Trees to Shade Buildings

This measure considers the effect trees can have in reducing energy required to heat and cool buildings. Trees properly planted with energy savings in mind can reduce the amount of energy (electricity, natural gas, or other fuel) used to cool and heat buildings. This not only reduces associated emissions, but also saves money. The shade from a single well-placed mature tree reduces annual air conditioning use two to eight percent (in the range of 40-300 kWh), and peak cooling demand two to ten percent (as much as 0.15-0.5 kW).

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with the Tree Advisory Board and local garden clubs to develop best practices to encourage tree planting for shading buildings.

**Cost:** \$112,000 (\$224 per tree)

**Payback:** 11 years

**Co-Benefits:**   

### Scope

500 trees

### Annual Reductions

**CO<sub>2</sub>e:** 38 tonnes

**Energy:** 102,000 kWh

**\$:** \$10,200

**NO<sub>x</sub>:** 101 lbs

**SO<sub>x</sub>:** 428 lbs

**CO:** 106 lbs

**VOCs:** 12 lbs

**PM<sub>10</sub>:** 94 lbs

# Community Land + Water Use Measures

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**   

## Scope

6,500 Residents using low maintenance landscaping

## Annual Reductions

**CO<sub>2</sub>e:** 326 tonnes

**Energy:** 219,375 kWh

**Water:** 87,750,000 gal

**Gasoline:** 26,000 gal

**NOx:** 296 lbs

**SOx:** 926 lbs

**CO:** 17,805 lbs

**VOCs:** 125,369 lbs

**PM<sub>10</sub>:** 239 lbs

## Low-Maintenance Landscaping

Well-groomed green lawns are aesthetically pleasing, but they come with a number of environmental costs. Landscaping using local native plants can greatly reduce or eliminate the need for irrigation, pesticides, and gasoline powered maintenance equipment.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with local garden clubs and other experts to develop best practices to encourage low maintenance landscaping in our community.

**Cost:** 15,000 (\$60 per lawnmower)

**Payback:** Not available

**Co-Benefits:**    

## Scope

250 lawnmowers replaced

## Annual Reductions

**CO<sub>2</sub>e:** N/A

**VOCs:** 4,750 lbs

## Gasoline Lawnmower Replacement

While the amount of fuel used by gasoline lawnmowers and yard equipment is small compared to the quantity used by automobiles, they pollute disproportionately--one mower can produce as much pollution as 43 cars. Overall, gasoline yard equipment can cause about 5% of local air pollution. Replacing these gasoline-powered tools with electric or human-powered ones can reduce emissions significantly.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with local garden clubs and other experts to develop best practices to encourage low maintenance landscaping in our community and the use of low or no emission maintenance equipment.

## Non-Asphalt Pavements

Paving alternatives can reduce the urban heat island effect, reducing energy use for cooling. Asphalt is made with petroleum products and can release large amounts of volatile organic compounds (VOCs), a primary component of smog, into the air while curing. In the Chicago metropolitan area, for example, asphalt paving emitted 13 tons of VOCs into the air each day during the summer peak smog season. One option for reducing emissions is to use asphalt with reduced VOC content. Many areas already prohibit the use of the high-VOC cutback asphalt, which uses petroleum-based thinner, during times when smog is a problem.

The Town of Bedford, with the Bedford 2020 Coalition and its partners, should work with local resources to develop best practices to encourage the use of Non-Asphalt Pavements in our community.

**Cost:** Not available

**Payback:** Not available

**Co-Benefits:**   

# IMPLEMENTATION

## a. Bedford 2020 Coalition

Achieving meaningful reductions of GHG emissions and addressing the threats to our environment require significant effort at the local grassroots level. The Town of Bedford is ready the for creation of a sustainable community.

The appointment of the Bedford Energy Advisory Panel and the resolution, committing our town to a twenty percent reduction of community wide emissions by the year 2020, set the town on a course toward a sustainable way of life. Since April 2007, we have successfully engaged the community, completed a greenhouse gas emissions inventory and written a climate action plan, all readying us for the implementation phase.

Town Board approval of the Climate Action Plan will be the final step in transitioning from the government appointed Bedford Energy Advisory Panel to a community-wide partnership including municipal government, residents, local businesses, schools, civic and religious entities. On the municipal level, local government will implement municipal measures. On the community level, a new entity, the Bedford 2020 Coalition will be created as a private, nonprofit corporation whose mission will be to organize, facilitate and work with each stakeholder to implement the community actions set forth in the Climate Action Plan. It is anticipated that the Bedford 2020 Coalition will oversee the creation of a total of 11 Task Forces, led by community members, focused on the following six subject areas: energy, waste/recycling, transportation, land use, food/agriculture, and water. In addition, there will be four Task Forces focused on users in the community, such as residents, businesses, schools and civic/religious entities. The last Task Force will be focused on marketing and PR as we try to educate the community about the benefits of changed behavior. Under the leadership of the Bedford 2020 Coalition, each Task Force will interact with the others to assist in implementation of the Climate Action Plan.

No single sector of our community can reach the Town's goal of a 20% reduction in GHG emissions by 2020 by acting alone. We must all work together. Residents, businesses, schools and civic and religious institutions all have a unique role to play.

The residential sector is the greatest contributor to community wide GHG emissions. 53% of the town's GHG emissions comes from household energy use and personal vehicles. The Bedford 2020 Coalition will oversee a community wide, public campaign to educate, inform and inspire Bedford's residents to take action in their own lives.



The Bedford 2020 Coalition will work with businesses both large and small to reduce GHG emissions in their own operations by focusing on their own buildings and facilities, their business practices and their relations with employees, vendors, contractors and customers. It is the intention of the Bedford 2020 Coalition to promote those businesses who are strong partners in this effort.

The two public school districts and the private schools within the town's geographic borders are uniquely positioned to help us reach our Twenty by 2020 goals. With multiple buildings, a vehicle fleet, waste generation and campus use contributing to their overall GHG emission, they are dealing with all four sectors of energy, transportation, waste/recycling and land use in their own sustainability efforts. Both area school districts--the Bedford Central School District (BCSD) and the Katonah Lewisboro School District (KLSD)-- have instituted Sustainability Policies that are models for the Town.

Like the schools, most civic and religious entities in the Town of Bedford confront GHG emission issues in the management of their buildings and land, their waste and in their relationship with constituents. Like the schools, their leadership in the area of GHG emission reductions will have tremendous impact throughout the community.

## **b. Measuring our Progress**

To ensure effective implementation, our progress will be closely monitored by the Town of Bedford and the Bedford 2020 Coalition. We will be completing periodic updates to our GHG emissions inventory in addition to occasionally surveying the town businesses and residents for observed behavior changes and input. This influx of data will allow us to track our progress, adjust our measures as needed and set new goals for the future. Progress reports will be made available to the public through both the town's and Bedford 2020 Coalition's websites.

## **c. Implementation Timeframe Table**

We have organized the Climate Action Plan measures into a simplified table below. Each has been considered within a 10 year implementation timeframe, beginning immediately and ending with our goal at the end of 2020. Measures have been grouped into short, medium and long term projects. Short term, refers to measures targeted for implementation between now and 2012, medium: from 2012 until 2015, and long: 2015 until the end of 2020. These qualifiers refer to the amount of time it will take to galvanize support and start the implementation process, however as we move forward and circumstances change, there may be a shift in timeframe. Progress will be reviewed regularly by the Town of Bedford and the Bedford 2020 Coalition. Some of these measures will be completed with a single action while others will require ongoing support in order for maximum success.

# Energy

Measure	tonnes CO <sub>2</sub> e reduced	who will implement	timeframe		
			S	M	L
Financing for Residential Energy Efficiency Retrofits					
	46,257	Community	x	x	x
Community Scale Renewable Energy	803	Municipal	x		
	51,753	Community	x		
Energy Efficiency Retrofits of Existing Facilities	177	Municipal	x		
	7,702	Community		x	x
Energy Efficiency Education Targeted at Business					
	3,965	Community	x		
Require Home Energy Rating (HERs) at Time of Sale					
	7,236	Community	x		
Promote Existing Home Weatherization Programs					
	1,206	Community	x		
Bedford Residential Building-Energy Code					
	1,628	Community	x		
Bedford Commercial Building Energy Code/Municipal Green Building Policy	0	Municipal	x		
	124	Community	x		
Municipal Energy Efficiency Purchasing Policy	N/A	Municipal	x		
Energy Efficient/Energy Star Appliances	28	Municipal	x	x	x
	4,651	Community	x	x	x
Heating and Cooling	13	Municipal	x	x	x
	3,821	Community	x	x	x

Measure	tonnes CO <sub>2</sub> e reduced	who will implement	timeframe		
			S	M	L
Compact Fluorescent Light Bulb (CFL) Distribution					
	16	Community	x		
Efficient Lighting Retrofits (for Non-Residential Buildings)	12	Municipal		x	
	1,184	Community		x	
Lighting Occupancy Sensors	35	Municipal	x		
	1,973	Community	x		
LED Holiday Lights					
	6	Community			
Solar Photovoltaic (PV) Energy	21	Municipal	x		
	825	Community	x	x	x
Solar Hot Water	N/A	Municipal	x	x	
	454	Community	x	x	
Switch Electric Heat to Natural Gas					
	1,889	Community	x	x	
Energy Efficient Affordable Housing					
	29	Community		x	x
Residential Construction Fee-bate Program					
	N/A	Community		x	
Ordinance Review for Renewable Energy Installation					
	N/A	Community	x		
Smart Meters					
	N/A	Community		x	
Accelerate Permitting Process for Green Buildings					
	N/A	Community	x		

# Transportation

Measure	tonnes CO <sub>2</sub> e reduced	who will implement	timeframe		
			S	M	L
Use Smaller Fleet Vehicles	9	Community	x	x	
	4,738	Municipal	x	x	
Increase Ownership of Hybrid Vehicles	49	Community	x	x	
	1,031	Municipal	x	x	
Fleet Conversion to Biodiesel (B20)	46	Community	x		
	300	Municipal	x		
Education on Low-carbon Transportation Options					
	1,100	Community	x		
Electric Vehicles	16	Community		x	
	169	Municipal		x	
Electric Vehicle Charging Stations on Parking Structures and Other Locations					
	50	Community		x	
Compressed Natural Gas (CNG) Vehicles	6	Municipal		x	
	184	Community		x	
Promote Public Transportation, Carpooling and Vanpooling	1	Municipal	x		
	2,241	Community	x		
Initiate a Carshare					
	172	Community	x		
Increase Rail Transit Ridership	17	Municipal	x		
	132	Community		x	x
Increase School Bus Ridership					
	181	Community	x		

Measure	tonnes CO <sub>2</sub> e reduced	who will implement	timeframe		
			S	M	L
Increase Bus Ridership + Regional Transportation Study					
	69	Community		x	
Enforce Anti-Idling Law for Trucks	27	Municipal	x		
	266	Community	x		
Enforce Anti-Idling Law for Non-Emergency Cars	N/A	Municipal	x		
	N/A	Community	x		
Enforce Anti-Idling Law for Local Transit Buses and School Buses					
	127	Community	x		
Increase Bike and Pedestrian Friendly Infrastructure, Create Bicycle Friendly Zones					
	835	Community		x	
Integrate Bicycles and Transit					
	4,036	Community	x	x	
Create pedestrian friendly zones and increase hamlet sidewalks					
	6	Community		x	
Provide Bicycles for Daily Trips					
	38	Community		x	
Police on Bicycles	21	Municipal	x		
Safe Routes to School					
	55	Community	x		
Retrofit School Buses with Oxydation Catalysts					
	N/A	Community	x		
School Bus Emissions Controls--Particulate Trap					
	N/A	Community	x		

# Waste + Recycling

Measure	tonnes CO <sub>2</sub> e reduced	who will implement	timeframe		
			S	M	L
Bedford Waste and Recycling Study					
	N/A	Community	x		
Develop Reporting Requirements for Carters					
	N/A	Community	x		
Establish/Expand Curbside Recycling Programs. Increase Plastic Recycling Eligibility					
	14,499	Community		x	
Waste and Recycling Education Campaign					
	N/A	Community	x		
Implement Pay-as-You-Throw Program					
	8,263	Community		x	
Reuse Facilities/Programs					
	6,652	Community	x		
Establish/Expand Business Recycling Programs					
	3,156	Community	x		
Organics Composting Facility					
	4,052	Community	x		
Home Composting Initiative					
	1,153	Community	x		
Expand/Enhance Existing Municipal Composting	N/A	Municipal	x		
Composting Bins at Town Parks	N/A	Municipal	x		

Measure	tonnes CO <sub>2</sub> e reduced	who will implement	timeframe		
			S	M	L
Reuse or Recycling of Construction Materials	N/A	Municipal		x	
	N/A	Community		x	
Zero Waste Goal for Public Events and Events on Public Land	N/A	Municipal	x		
	N/A	Community	x		
Green Business Programs					
	2,816	Community	x		
Plastic & Paper Bag Fee/ Re-usable Bag Distribution					
	N/A	Community	x		
#6 Plastic Ban					
	N/A	Community		x	
Tap Water Campaign					
	N/A	Community	x		
Municipal Greep Procurement and Recycling	N/A	Municipal	x		
Low-VOC Procurement Policy for Cleaning Products and Paint	N/A	Municipal	x		

# Land + Water Use

Measure	tonnes CO <sub>2</sub> e reduced	who will implement	timeframe		
			S	M	L
Transit Oriented Development					
	588	Community		x	x
Build Water Capacity through Municipal Codes and Regulations					
	N/A	Community	x		
Modified Town Water Billing System					
	N/A	Community	x		
Water Conservation	2	Municipal	x		
	1,229	Community	x		
Increase Supply, Availability and Consumption of Local Food					
	N/A	Community	x	x	x
Plant and Preserve Trees					
	126	Community	x	x	
Plant Trees to Shade Buildings	2	Municipal	x	x	
	38	Community	x	x	
Low-Maintenance Landscaping	2	Municipal	x		
	326	Community	x		
Gasoline Lawnmower Replacement					
	N/A	Community		x	
Non-Asphalt Pavements	N/A	Municipal	x		
	N/A	Community	x		



# GLOSSARY

**Anthropogenic:** Caused or produced by humans

**B-20 Biodiesel:** A blend of 20% biodiesel and 80% petroleum diesel

**BEAP:** The Bedford Energy Advisory Panel

**CAP:** Climate Action Plan

**Cap and Trade:** A policy that mandates cap on emissions while providing an ability to trade allowances. Successful cap and trade programs reward innovation, efficiency, and early action and provide strict environmental accountability without inhibiting economic growth.

**CFL:** Compact Fluorescent Light Bulbs

**CH<sub>4</sub>:** Methane, a powerful greenhouse gas

**CNG:** Compressed Natural Gas

**CO:** Carbon Monoxide

**CO<sub>2</sub>:** Carbon Dioxide

**CO<sub>2</sub>e:** Carbon dioxide equivalent units – converting all emissions to equivalent carbon dioxide units allows for the consideration of different greenhouse gases on comparable terms

**Energy Star:** ENERGY STAR is a partnership between the U.S. Environmental Protection Agency and industry to voluntarily label products that meet certain energy efficiency criteria

**EPA:** Environmental Protection Agency

**Feedback Loops:** A pattern of interacting processes where a change in one variable, through interaction with other variables in the system, either reinforces the original process (positive feedback) or suppresses the process (negative feedback).

**GPM:** Gallons per minute

**Greenhouse Gas (GHG):** the term used for gases that trap heat in the atmosphere. The principal greenhouse gases that enter the atmosphere as a result of human activity are carbon dioxide, methane, and nitrous oxide

**HERs:** Acronym for Home Energy Rating

**HVAC:** Acronym for Heating, Ventilating, and Air Conditioning

**ICLEI:** The International Council for Local Environmental Initiatives, a membership association of local governments focused on addressing the climate challenge

**IPCC:** Intergovernmental Panel on Climate Change

**kW:** A kilowatt, equal to 1,000 watts

**kWh:** A kilowatt hour (1,000 watt-hours), the work performed by one kilowatt of electric power in one hour

**Kyoto Protocol:** The United Nations Treaty that targets the reduction of greenhouse gas emissions

**LED:** Light emitting diode

**LEED:** Leadership in Energy and Environmental Design, a commonly used green building standard developed by the U.S. Green Building Council

**Life Cycle Assessment:** The investigation and valuation of the environmental impacts of a given product or service caused or necessitated by its existence

**Metric ton:** 1,000 kilograms (or 2204.6226 lbs.). Also known as a “tonne.”

**MMBtu:** Million British Thermal Units, unit of energy equivalent to 10 therms.

**MPG:** Miles Per Gallon

**NOx:** Nitrogen Oxides

**NYSERDA:** New York State Energy Research and Development Authority

**PM10:** Coarse Particulate Matter

**PV:** Photovoltaics, a solar power technology that converts sunlight into electricity

**Renewable Energy (RE):** Energy generated from natural resources - such as sunlight, wind, rain, tides and geothermal heat - which are naturally replenished.

**Solar thermal:** A technology that captures solar energy for heat

**SOx:** Sulfur Oxides

**Bedford 2020 Coalition:** Community-wide entity stakeholders formed to implement the measures contained in the Bedford CAP.

**Therm:** 100,000 British Thermal Units (BTUs), equivalent to approximately 100 standard cubic feet of natural gas

**T/CO<sub>2</sub>e:** Metric Tonnes of CO<sub>2</sub> equivalent

**TOD:** Transit Oriented Development

**VMT:** Vehicle miles traveled

**VOCs:** Volatile Organic Compounds

**Weatherization:** The reduction of air infiltration by methods such as caulking and weather stripping

**Xeriscaping:** Landscape with little need for water

**Zero Waste:** The City's goal to eliminate waste sent to the landfill by 2020. All of the community's discarded material would be recycled or reused



# ACKNOWLEDGEMENTS

The Bedford Climate Action Plan was designed and prepared by Jesse Catalano, A Middlebury College student, whose participation in this project was made possible by The Bedford Garden Club and the Open Space Institute's Barnabus McHenry Grant. The members of the Bedford Energy Advisory Panel provided direction, data and review of this plan.

## Town of Bedford

Lee V.A. Roberts, Supervisor  
Christopher Burdick, Town Councilman  
Peter Chryssos, Town Councilman, Deputy Supervisor  
Francis Corcoran, Town Councilman  
David Gabrielson, Town Councilman

## Bedford Energy Advisory Panel Members

William Abranowicz	Daniel Martin
Shirley Bianco	Lisa Schwartz
Janet Harkham	Simon Skolnik
Neal Hundt	Mark Theilking
Mary Beth Kass, Chair	Dr. Stuart Weitzman

## Other Town of Bedford Contributors

Gail Amyot, Planning Department  
Lisbeth Fumagalli, Town Clerk  
Joan Gallagher, Director of Personnel  
William Heidepriem, Superintendent, Recreation and Parks Department  
Kim Kowalski, Administrative Assistant to the Supervisor and Town Clerk  
Robert Mascianica, Deputy Commissioner, Department of Public Works  
Bill Magrino, Head Custodian and Head of the TOB Green Team  
Marcy Marchiano, Confidential Secretary to the Supervisor  
Rick Megna, Building Inspector  
Chris Menzel, Chief of Police  
Jeffrey Osterman, Director of Planning  
Thomas Polzella, Assessor  
Ed Ritter, Comptroller  
Joel H. Sachs, Esq., Keane & Beane, P.C.  
Kevin Winn, Commissioner, Department of Public Works

Bedford Twenty by 2020 logo designed by Carol Bouyoucous

Overall layout, photos, charts and graphs designed by Jesse Catalano

## ICLEI - Local Governments for Sustainability

Missy Stults, Senior Program Officer, Northeast Regional Capacity Center



# SOURCES

We'd like to thank Westchester County, NY and the cities of Berkely CA, Worcester MA, Portland OR, Chicago, IL, Cambridge MA whose Climate Action Plans inspired us.

## **I. Introduction (p. 8-14)**

### **a. Climate Science**

- The Intergovernmental Panel on Climate Change, Third Assessment Report "Climate Change 2001: The Scientific Basis"
- Environmental Protection Agency (EPA)

### **c. Our Climate Action Plan (Quality of Life & Health)**

- Cambridge, MA Climate Action Plan
- Westchester County, NY Climate Action Plan
- Environmental Protection Agency (EPA)

### **c. Our Climate Action Plan (Energy Security)**

- House Committee on Energy Independence & Global Warming

### **c. Our Climate Action Plan (Climate)**

- NECIA Report: Confronting Climate Change in the U.S. Northeast 2007
- The Intergovernmental Panel on Climate Change, Third Assessment Report "Climate Change 2001: The Scientific Basis"
- The Intergovernmental Panel on Climate Change, Fourth Assessment Report "Climate Change 2007"
- Westchester County, NY Climate Action Plan

## **II. Greenhouse Gas Emissions Inventory (p. 18-21)**

- Town of Bedford, New York Greenhouse Gas Emissions Analysis, prepared by the Bedford Energy Advisory Panel with assistance for ICLEI, Local Governments for Sustainability

## **III. Reduction Measures (p. 22-87)**

- The Climate and Air Pollution Planning Assistant (CAPPA), developed by ICLEI, Local Governments for Sustainability and sponsored by the Environmental Protection Agency
- Food Measures - Portland Oregon Climate Action Plan
- Tree Measures - Christian Science Monitor, April 16, 2003 Edition



# APPENDIX

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- e. Conclusion . . . . . 116



## RESOLUTION

RESOLVED that the Town Board of the Town of Bedford does hereby make a commitment to reduce the greenhouse gas emissions from the 2004 baseline in the Town by 20% by the year 2020 and shall continue to take measures such as the procurement of hybrid vehicles, open space and the construction of bike paths to work towards this commitment level in order to better the environment for the residents of the Town of Bedford and the global community.

STATE OF NEW YORK }  
COUNTY OF WESTCHESTER } SS.  
TOWN OF BEDFORD }

*I hereby certify that I have compared the foregoing Resolution with the original on file in my office, and that the same is a correct transcript therefrom and the whole of the said original Resolution, which was duly adopted by the Town Board of the Town of Bedford, on November 20, 2007.*

*IN WITNESS WHEREOF, I have hereunto set my hand and affixed the  
Corporate Seal of said Town of Bedford,*

*Dated: November 21, 2007*

 *Lisbeth Lomagelli* Town Clerk,  
Town of Bedford

# Town of Bedford, New York Greenhouse Gas Emissions Analysis

## **2004 Community Emissions Inventory & 2004 Government Operations Emissions Inventory**

March 12, 2009

Updated on 6/8/09 to reflect change in fuel oil data

**bedford** twenty by **2020**



## **Credits and Acknowledgements**

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Kevin Winn, Commissioner, Department of Public Works

### **Bedford Twenty by 2020 logo designed by Carol Bouyoucous**

Town of Bedford Emissions Inventory, March 2009

## **ICLEI – Local Governments for Sustainability**

Missy Stults, Senior Program Officer, Northeast Regional Capacity Center

This report was prepared with assistance from ICLEI – Local Governments for Sustainability. The authors gratefully acknowledge the dedication of the staff of the town of Bedford, who provided much of the insight and local knowledge necessary for the completion of this report.

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# 1 Introduction

In April 2007, The Town of Bedford joined ICLEI; the Town Board adopted a resolution committing the Town to taking action for climate protection. Through this resolution, the Town recognized the “profound effect” that greenhouse gases emitted by human activity are having on the Earth’s climate, as well as the Town’s opportunity to reduce these emissions, both through its government operations and by inspiring change throughout the community. Through energy efficiency in its facilities and vehicle fleet, alternative clean energy sources, waste reduction efforts, land use and transit planning, and other activities, the Town of Bedford can achieve multiple benefits, including saving energy and money, reducing emissions, and preserving quality of life in our community. With the assistance of ICLEI – Local Governments for Sustainability, the Town has begun its efforts to identify and reduce greenhouse gas emissions.

This document represents completion of the first milestone in ICLEI’s five milestone process: conducting an inventory of greenhouse gas emissions. Presented here are estimates of greenhouse gas emissions resulting from our community as a whole, as well as those resulting from the Town’s internal government operations. Due to data availability, community data and government operations data is based on the year 2004. This data will provide a baseline against which we will be able to compare future performance, enabling us to demonstrate progress in reducing emissions.

## 1.1 Climate Change Background

A balance of naturally occurring gases dispersed in the atmosphere determines the Earth’s climate by trapping solar heat. This phenomenon is known as the greenhouse effect. Modern human activity, most notably the burning of fossil fuels for transportation and electricity generation, introduces large amounts of carbon dioxide and other gases into the atmosphere. Collectively, these gases intensify the natural greenhouse effect, causing global average surface temperature to rise, which is in turn expected to affect global climate patterns.

Overwhelming evidence suggests that human activities are increasing the concentration of greenhouse gases in the atmosphere, causing a rise in global average surface temperature and consequent climate change. In response to the threat of climate change, communities worldwide are voluntarily reducing greenhouse gas emissions. The Kyoto Protocol, an international effort to coordinate mandated reductions, went into effect in February 2005 with 161 countries participating. The United States is one of three industrialized countries that chose not to sign the Protocol.

In the face of federal inaction, many communities in the United States are taking responsibility for addressing climate change at the local level. Westchester County and the Town of Bedford are likely to be impacted by changes to local and regional weather patterns and species migration. Scientists also expect changing temperatures to result in more frequent and damaging storms accompanied by flooding and land slides, summer water shortages as a result of reduced snow pack, and disruption of ecosystems, habitats and agricultural activities.

## **1.2 The Communities for Climate Protection Campaign**

By adopting a resolution committing the Town to locally advancing climate protection, The Town of Bedford has joined an international movement of local governments. More than 1000 local governments, including over 500 in the United States, have joined ICLEI's Cities for Climate Protection (CCP) campaign.<sup>1</sup> In addition to The Town of Bedford the neighboring towns of Cortland, Croton-on-Hudson, Dobbs Ferry, Greenburgh, Hastings-on-Hudson, Larchmont, Mamaroneck, Mt. Kisco, New Castle, New Rochelle, North Castle, Ossining, Tarrytown, Yonkers, Yorktown and Westchester County are all CCP participants.

The CCP campaign provides a framework for local communities to identify and reduce greenhouse gas emissions, organized along five milestones:

- (1) Conduct an inventory of local greenhouse gas emissions;
- (2) Establish a greenhouse gas emissions reduction target;
- (3) Develop an action plan for achieving the emissions reduction target;
- (4) Implement the action plan; and,
- (5) Monitor and report on progress.

This report represents the completion of the first CCP milestone, and provides a foundation for future work to reduce greenhouse gas emissions in The Town of Bedford.

## **2 Greenhouse Gas Emissions Inventory**

The first step toward reducing greenhouse gas emissions is to identify baseline levels and sources of emissions in The Town of Bedford, as well as the sectors of our community and government operations that are responsible for the bulk of these emissions. This information can later inform the selection of a reduction target and possible reduction measures.

### **2.1 Methodology and Model**

ICLEI's Communities for Climate Protection methodology assists local governments to systematically track energy and waste related activities in the community, and to calculate the relative quantities of greenhouse gases produced by each activity and sector. The inventory methodology involves performing two assessments: a communitywide assessment and a separate inventory of government facilities and activities. The government inventory is a subset of the community inventory.

Once completed, these inventories provide the basis for the creation of an emissions forecast, and allow for the quantification of emissions reductions associated with proposed measures.

---

<sup>1</sup> ICLEI was formerly known as the International Council for Local Environmental Initiatives, but the name has been changed to ICLEI – Local Governments for Sustainability.

### ***2.1.1 CACP Software***

To facilitate community efforts to reduce greenhouse gas emissions, ICLEI developed the Clean Air and Climate Protection (CACP) software package with the State and Territorial Air Pollution Program Administrators (STAPPA), the Association of Local Air Pollution Control Officials (ALAPCO), and Torrie Smith Associates. This software calculates emissions resulting from energy consumption and waste generation. The CACP software determines emissions using specific factors (or coefficients) according to the type of fuel used. Greenhouse gas emissions are aggregated and reported in terms of equivalent carbon dioxide units, or CO<sub>2</sub>e. Converting all emissions to equivalent carbon dioxide units allows for the consideration of different greenhouse gases in comparable terms. For example, methane is twenty-one times more powerful than carbon dioxide on a per molecule basis in its capacity to trap heat, so the CACP software converts one ton of methane emissions to 21 tons of carbon dioxide equivalents. The CACP software is also capable of reporting input and output data in several formats, including detailed, aggregate, source-based and time-series reports.

The emissions coefficients and methodology employed by the CACP software are consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National Inventories) and the U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA form 1605).

The CACP software has been and continues to be used by over 500 U.S. cities, towns, and counties to reduce their greenhouse gas emissions. However, it is worth noting that, although the software provides The Town of Bedford with a sophisticated and useful tool, calculating emissions from energy use with precision is difficult. The model depends upon numerous assumptions, and it is limited by the quantity and quality of available data. With this in mind, it is useful to think of any specific number generated by the model as an approximation of reality, rather than an exact value.

### ***2.2.2 Creating the Inventory***

Our greenhouse gas emissions inventory consists of two essentially distinct inventories: one for the Town of Bedford community as a whole, defined by our geographic borders, and one highlighting emissions resulting from the Town of Bedford's internal government operations. The government inventory is a subset of the community-scale inventory (the two are not mutually exclusive). This allows the government, which formally committed to reducing emissions, to track its individual facilities and vehicles and to evaluate the effectiveness of its emissions reduction efforts at a more detailed level. At the same time, the community-scale analysis provides a performance baseline against which we can demonstrate progress being made throughout the Town of Bedford community.

Creating our emissions inventory required the collection of information from a variety of sources (See Appendix 1 for inventory source data.) Data from the year 2004 was used for both the community inventory and the government inventory.

When calculating the Town of Bedford's emissions inventory, all energy consumed in the Town of Bedford was included. This means that, even though the electricity used by Town of Bedford residents is produced elsewhere, this energy and the emissions associated with it appears in the Town of Bedford's inventory. The decision to calculate emissions in this manner reflects the general philosophy that a community should take full responsibility for the impacts associated with its energy consumption, regardless of whether or not the energy generation occurs within its geographic borders.

## 2.2 Inventory Results

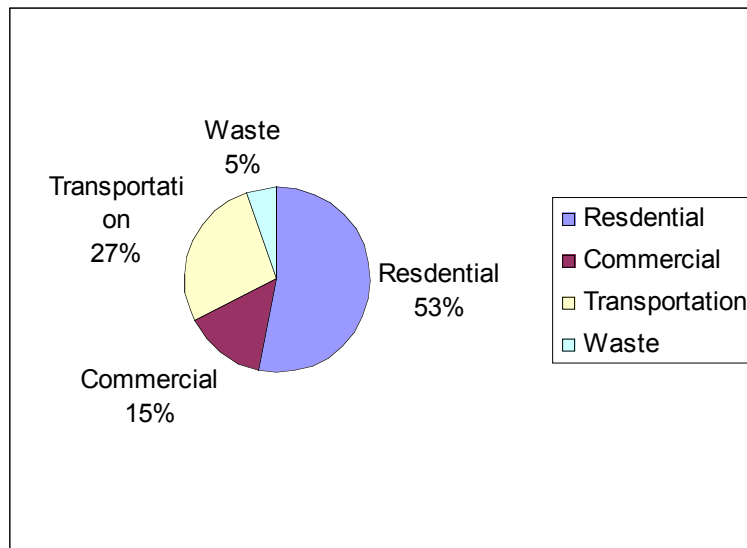
### 2.2.1 Community Emissions Inventory

In the base year 2004, the community of The Town of Bedford emitted approximately 275,951 tonnes of CO<sub>2</sub>e. As shown in Table 1, and illustrated in the pie chart below, Residential use was the greatest contributor to greenhouse gas emissions at 53% of the total. The Commercial sector contributed 15%, Transportation contributed 27%, and Waste contributed 5% of the community's total greenhouse gas output.

**Table 1: The Town of Bedford Community-Wide Greenhouse Gas Emissions in 2004**

<b>Sector</b>	<b>Greenhouse Gas Emissions (tonnes CO<sub>2</sub>e)</b>	<b>Energy Equivalent (MMBtu)</b>
Residential	146,451	1,806,823
Commercial	40,116	400,452
Transportation	74,693	959,118
Waste	14,691	
<b>Total</b>	<b>275,951</b>	<b>3,166,393</b>

**Figure 1. The Town of Bedford Community-Wide Greenhouse Gas Emissions in 2004**



The Town of Bedford community's consumption of electricity and other fuels in local buildings and vehicles is also responsible for the release of criteria air pollutants, including NO<sub>x</sub>, SO<sub>x</sub>, CO, VOCs, and PM<sub>10</sub>. The Transportation sector is responsible for the majority of NO<sub>x</sub>, CO and VOC emissions, while energy used in buildings is primarily responsible for emissions of SO<sub>x</sub> and PM<sub>10</sub>.

**Table 2. The Town of Bedford Community-Wide Criteria Air Pollutant Emissions in 2004**

Sector	NO <sub>x</sub> (lbs)	SO <sub>x</sub> (lbs)	CO (tonnes)	VOCs (lbs)	PM <sub>10</sub> (lbs)
Residential	472,950	502,916	79	24,440	126,786
Commercial	110,210	305,689	37	9,756	68,026
Transportation	580,583	30,162	1,966	455,526	17,166
<b>Total</b>	<b>1,163,743</b>	<b>838,766</b>	<b>2,082</b>	<b>489,722</b>	<b>211,977</b>

### ***2.2.2 Government Emissions Inventory***

In the base year 2004, The Town of Bedford's government operations generated 5,360 tonnes of CO<sub>2</sub>e. The Town's buildings were the greatest contributors, emitting 74% of the total. The vehicle fleet contributed 20%, streetlights contributed 5%, and waste contributed 1% of the government emissions.

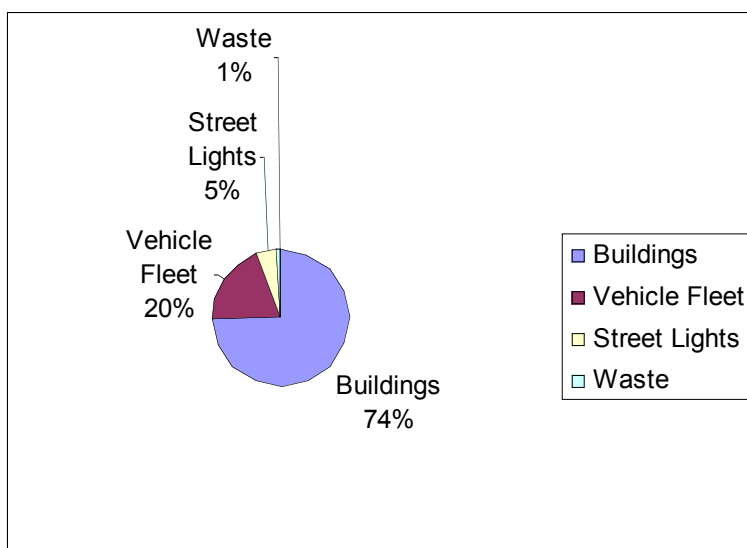
During 2004, the Town of Bedford government spent approximately \$552,923 on energy-related expenses for its buildings, streetlights and vehicles. Beyond reducing harmful greenhouse gases, any future reductions in government operations' energy use have the potential to reduce this expense, enabling the Town of Bedford to reallocate limited funds toward other deserving causes. Table 3 and Figure 2 below illustrate the breakdown of government operations emissions by

source type. (See Appendix 2 for a detailed listing of government operations energy consumption and greenhouse gas emissions by activity.)

**Table 3: The Town of Bedford Government Operations Emissions Summary**

Sector	Greenhouse Gas Emissions (tonnes CO <sub>2</sub> e)	Energy Equivalent (million Btu)	Cost (\$)
Buildings	4,000	64,611	229,415
Vehicle Fleet	1,056	13,466	148,436
Streetlights	251	2,118	96,399
Waste	53		78,673
<b>TOTAL</b>	<b>5,360</b>	<b>80,194</b>	<b>552,923</b>

**Figure 2. Government Operations Greenhouse Gas Emissions in 2004**



Government operations emissions in The Town of Bedford constitute about 2.6 percent of the community's total greenhouse gas emissions. This is not unusual; local government emissions typically account for around two percent of community levels. As a minor contributor to total emissions, actions to reduce government operations energy use will have a limited impact on The Town of Bedford community's overall emissions levels. However, as previously mentioned, government action has symbolic value that extends beyond the magnitude of emissions actually reduced.

**Table 4. The Town of Bedford Building Energy Use Greenhouse Gas Emissions in 2004<sup>2</sup>**

Site	Light fuel Oil Use (US Gal)	Light fuel Oil Cost(\$)	Electricity Use (kWh)	Electricity Cost (\$)	Natural Gas Use (therms)	Natural Gas Cost (\$)	Energy Equivalent (MMBtu)	Greenhouse Gas Emissions (tonnes CO <sub>2</sub> e)
21 Park Ave	1,839	2,312			3,078	3,415	3,397	195
301 Adams	6,841	8,464	55,593	7,794			1,147	94
425 Cherry St			107,340	12,994	2,400	2,735	2,815	181
87 Adams	162	168					1	0
Annex 307, 309 Bedford Rd			26,563	3,329			91	11
BH Community House	4,308	5,525	18,263	3,169	3,402	1,042	4,136	247
Cedar Downs Pump house					34,072	6,061	34,757	1,948
Crusher Rd Garage	2,753	3,300					385	29
Depot Plaza			2,400	488	1,135	1,368	1,166	66
Guard Hill Tower					3,648	836	3,721	209
Haines Rd Soccer Fld			5,540	2,517			19	2
Charles Rd – Hwy					742	298	757	42
Rt 22 – Hwy Garage			16,384	2,281			56	7
Police Station	3,707	4,881	182,340	19,153			1,141	113
Rec – pools/filters/ bathhouse/concession	510 (propane)	704	236,821	28,137			856	99
Tenant Space			9,983	1,380			34	4
321 Bedford Road			183,520	22,087	7,020	7,644	7,788	476
Water Pumps/ Facilities/Tanks			687,108	77,333			2,345	278
<b>Buildings Total</b>	<b>20,120</b>	<b>25,354</b>	<b>1,531,855</b>	<b>180,662</b>	<b>55,497</b>	<b>23,399</b>	<b>64,611</b>	<b>4000</b>

**Table 5. The Town of Bedford Street and Traffic Lighting Greenhouse Gas Emissions in 2004**

Site	Electricity Use (kWh)	Electricity Cost (\$)	Energy Equivalent (MMBtu)	Greenhouse Gas Emissions (tonnes CO <sub>2</sub> e)
Traffic Signals	37,945	5,990	130	15
Parking Lots	72,546	11,300	248	29
Flashing Light – Rt 172	1,412	215	5	1
Kat.Bed/BH	472,384	73,326	1,612	191
B.H. Street Lighting	36,162	5,568	123	15
<b>Street &amp; Traffic Total</b>	<b>620,449</b>	<b>96,399</b>	<b>2,118</b>	<b>251</b>

**Table 6. The Town of Bedford Vehicle Fleet Greenhouse Gas Emissions in 2004**

Department	Gasoline Consumption (gal)	Diesel Consumption (gal)	Total Fuel Cost (\$)	Energy Equivalent (MMBtu)	Greenhouse Gas Emissions (tonnes CO <sub>2</sub> e)
Police pump	40,564		57,306	5,095	3
Highway Pump	9,145	58,943	91,130	8,371	6
<b>Vehicle Fleet Total</b>	<b>49,709</b>	<b>58,943</b>	<b>148,436</b>	<b>13,466</b>	<b>1,0</b>

The Town of Bedford was also responsible for the release of criteria air pollution in 2004, as shown below. These pollutants have been linked with various environmental and public health outcomes and many of the actions we might take to reduce greenhouse gas emissions will also have a positive impact in reducing these pollutants as well.

**Table 7. The Town of Bedford Government Operations Criteria Air Pollutant Emissions in 2004**

Sector	NO <sub>x</sub> (lbs)	SO <sub>x</sub> (lbs)	CO (tonnes)	VOCs (lbs)	PM <sub>10</sub> (lbs)
Buildings	11,542	6,653	2	765	1,654
Streetlights	527	1,630		88	517
Vehicle Fleet	5,534	185	16	4,337	396
<b>Total</b>	<b>17,604</b>	<b>8,467</b>	<b>18</b>	<b>5,190</b>	<b>2,568</b>

### 3 Conclusion

In passing a resolution to join the Communities for Climate Protection campaign, The Town of Bedford made a formal commitment to reduce its emissions of greenhouse gases. This report lays the groundwork for those efforts by estimating baseline emissions levels against which future progress can be demonstrated.

This analysis found that The Town of Bedford community as a whole was responsible for emitting 275,951 tonnes of CO<sub>2</sub>e in the base year 2004, with the residential sector contributing 53 percent, the commercial sector contributing 15 percent, the transportation sector contributing 27 percent and the waste sector contributing 5 percent to this total. The Town of Bedford's government operations were responsible for 5,360 tonnes in 2004. The Town of Bedford's government operations account for roughly 2 percent of the community's total greenhouse gas emissions.

Following the ICLEI methodology, we recommend that The Town of Bedford's next forecast anticipated future emissions and engage in consideration of potential greenhouse gas reduction targets for both the community as a whole, and internal government operations. The Town should also begin to document emissions reduction measures that have already been implemented since the base years documented in this report, and to quantify the emissions benefits of these measures to demonstrate progress made to date.

Next, the Town should begin to identify potential new emissions reduction measures that might be implemented in the future, including energy efficiency, clean energy, vehicle fuel efficiency or alternative fuel use, trip reduction strategies, waste reduction, and other projects. We feel confident that a number of opportunities exist for the Town to reduce emissions while saving taxpayer dollars, improving efficiency and reducing waste.

The Town of Bedford's Energy Advisory Panel will advise and support the Town Supervisor and Town Board in continuing the climate protection efforts of The Town of Bedford. The Panel is eager to aid the Town in its demonstrated leadership on this important issue.

## Appendix 1 Data Sources

### *Community-Wide Emissions Inventory Source Data for 2004*

#### Community-Wide Aggregate Utility Data

	<b>Electricity (kWh)</b>	<b>Natural Gas (therms)</b>	<b>Light Fuel Oil (US Gal)</b>	<b>Energy Equivalent (MMBtu)</b>
Residential	93,424,722	2,284,570	8,999,250	1,806,823
Commercial	45,455,743	790,520	569,620	313,914
<b>Subtotal</b>	<b>138,880,465</b>	<b>3,075,090</b>	<b>9,568,870</b>	<b>2,120,737</b>

Data provided: NYSEG and Con Edison data 2004

#### Community-Wide Transportation Data

	<b>Vehicle Miles Traveled (millions)</b>	<b>Energy Equivalent (MMBtu)</b>
<b>Subtotal</b>	<b>124.3</b>	<b>959,118</b>

Transportation data from: New York Metropolitan Transportation Council – Michael Chiume (Senior Transportation Analyst)

#### Community-Wide Waste Data

	<b>Amount of Waste Landfilled (tons)</b>	<b>Waste Composition (%)</b>	<b>Equivalent CO2 (tonnes)</b>
<i>Community Waste</i>	15,239	100	14,691
Paper Products	5,791	38	
Food Waste	1,981	13	
Plant Debris	1,524	10	
Wood/Textiles	610	4	
All Other Waste	5,334	35	
<b>Total Waste Landfilled</b>	<b>15,239</b>	<b>100</b>	<b>14,691</b>

Waste data from: Assumptions based on EAP data on waste generation per person/day

## *Government Operations Emissions Inventory Source Data for 2004*

### **The Town of Bedford Building Energy Use**

	<b>Light Fuel Oil (US Gal)</b>	<b>Light Fuel Oil Cost (\$)</b>	<b>Electricity Use (kWh)</b>	<b>Electricity Cost (\$)</b>	<b>Natural Gas Use (therms)</b>	<b>Natural Gas Cost (\$)</b>
<b>Buildings</b>						
<b>Total</b>	<b>20,120</b>	<b>25,354</b>	<b>1,531,855</b>	<b>180,662</b>	<b>55,497</b>	<b>23,399</b>

Data provided: All municipal data was obtained from 2004 invoices (Feb 2004-Jan 2005) filed in the “paid prior” files in the basement of the Town House, 321 Bedford Road

### **The Town of Bedford Street and Traffic Lighting**

<b>Site</b>	<b>Electricity Use (KWH)</b>	<b>Electricity Cost (\$)</b>
Traffic Signals	37,945	5,990
Parking Lots	72,564	11,300
FlashLight – Rt 172	1,412	215
Kat.Bed/BH	472,384	73,326
B.H. Street Lighting	36,162	5,568

**Street/Traffic Total                      620,467                      96,399**

Data provided by: All municipal data was obtained from 2004 invoices (Feb 2004-Jan 2005) filed in the “paid prior” files in the basement of the Town House, 321 Bedford Road

### **The Town of Bedford Vehicle Fleet**

<b>Department</b>	<b>Gasoline Consumption (gal)</b>	<b>Diesel Consumption (gal)</b>	<b>Total Fuel Cost (\$)</b>
Police Pump	40,564		57,306
Highway Pump	9145	58943	91,130

**Subtotal Vehicle Fleet                      49,709                      58,943                      148,436**

Data provided by: All municipal data was obtained from 2004 invoices (Feb 2004-Jan 2005) filed in the “paid prior” files in the basement of the Town House, 321 Bedford Road

## Appendix 2 Inventory Reports

### *Community Emissions in 2004: Detailed Report*

	Equiv CO <sub>2</sub>	Equiv CO <sub>2</sub>	Energy Equivalent
	(tonnes)	(%)	(MMBtu)
<b>Residential</b>			
Town of Bedford Aggregate Residential Energy Use			
<i>Electricity</i>	39,193	14.2	318,856
<i>Light Fuel Oil</i>	94,453	34.2	364,498
<i>Natural Gas</i>	12,805	4.6	228,457
<i>Subtotal Residential</i>	146,451	53.1	911,811
<b>Commercial</b>			
Town of Bedford Aggregate Commercial Energy Use			
<i>Electricity</i>	19,069	10.8	155,139
<i>Industrial Electricity</i>	612	0.	4,980
<i>Municipal Electricity</i>	10,025	0.	81,558
<i>Light Fuel Oil</i>	5,979	2.2	79,722
<i>Natural Gas</i>	4,431	1.6	79,052
<i>Subtotal Commercial</i>	40,116	14.5	400,452
<b>Transportation</b>			
Town of Bedford Community VMT Estimate			
<i>Gasoline</i>	61,860	22.4	796,135
<i>Diesel</i>	12,833	4.7	162,983
<i>Subtotal Transportation</i>	74,693	27.1	959,118
<b>Waste</b>			
Land filled Community Waste			
<i>Paper Products</i>	11,233	4.1	
<i>Food Waste</i>	2,175	0.8	
<i>Plant Debris</i>	948	0.3	
<i>Wood/Textiles</i>	335	0.1	
<i>Subtotal Land filled Community Waste</i>	14,691	5.3	
<b>Total</b>	<b>275,951</b>	<b>100.0</b>	<b>3,166,393</b>

This report has been generated for The Town of Bedford, New York using STAPPA/ALAPCO and ICLEI's Clean Air and Climate Protection Software developed by Torrie Smith Associates Inc.

## Government Operations Emissions in 2004: Detailed Report

	Equiv CO <sub>2</sub> (tonnes)	Equiv CO <sub>2</sub> (%)	Energy Equivalent (MMBtu)
<b>Buildings</b>			
<i>Fuel Oil</i>	204	3.8	2,722
<i>Electricity</i>	620	11.6	5,229
<i>Natural Gas/Propane</i>	3176	59.3	56,660
<b>Subtotal Buildings</b>	<b>4,000</b>	<b>74.6</b>	<b>64,611</b>
<b>Vehicle Fleet</b>			
Highway Pump			
<i>Gasoline</i>	89	1.7	1,150
<i>Diesel</i>	571	10.6	7,213
<i>Subtotal DPW</i>	660	12.3	8,371
Police			
<i>Gasoline</i>	395	7.4	5,095
<i>Subtotal Police</i>	395	7.4	5,095
<b>Subtotal Vehicle Fleet</b>	<b>1,055</b>	<b>19.7</b>	<b>13,466</b>
<b>Streetlights</b>			
Traffic Signals			
<i>Electricity</i>	15	.3	130
<i>Subtotal Traffic Signals</i>	15	.3	130
Parking Lots			
<i>Electricity</i>	29	.5	248
<i>Subtotal Parking Lots</i>	29	.5	248
Flashing Light-Rt 172			
<i>Electricity</i>	1	0	5
<i>Subtotal Flashing Light</i>	1	0	5
Kat/Bed/BH			
<i>Electricity</i>	191	3.6	1,612
<i>Subtotal Kat/Bed/BH</i>	191	3.6	1,612
BH Street Lighting			
<i>Electricity</i>	15	.3	123
<i>Subtotal BH Street Lighting</i>	15	.3	123
<b>Subtotal Streetlights</b>	<b>251</b>	<b>4.7</b>	<b>2,118</b>
<b>Waste</b>	<b>53</b>	<b>1.0</b>	
<b>Subtotal Waste</b>	<b>53</b>	<b>1.0</b>	
<b>Total</b>	<b>5,360</b>	<b>100.0</b>	<b>80,194</b>

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# TOWN OF BEDFORD

## **Bedford Town House**

321 Bedford Road  
Bedford Hills, NY 10507